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Hearing loss self-management in older adults

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Abstract

Hearing health care has been described as predominantly biomedical in its approach, with an emphasis on technological interventions for hearing loss and a clinician-led style of practice. Emerging evidence suggests that these characteristics – all of which are hallmarks of a health care system designed to address acute, rather than chronic, conditions – may contribute to low rates of hearing help-seeking and hearing rehabilitation uptake and use among older adults. The overall aim of this research was therefore to investigate the applicability of a chronic care model of service delivery to hearing health care, with a focus on the complementary roles of self-management (individuals managing their hearing loss) and self-management support (audiologists supporting individuals to manage their hearing loss).

The research utilised a mixed methods approach within the theoretical frameworks of the Chronic Care Model and the World Health Organization's International Classification of Functioning, Disability and Health. The first three studies focused on self-management from the perspective of older adults with hearing loss. A total of 91 adults between the ages of 51 and 85 were assessed with the Partners in Health scale and the Cue and Response interview, two validated tools for measuring chronic condition self-management from the Flinders Chronic Condition Management Program™. The first study aimed to determine whether the assessment tools could be successfully adapted for audiological use and whether they yielded clinical information that was not currently being gathered with existing tools in the standard audiological test battery. Seven pilot participants provided iterative feedback on the wording of the tools in the initial modification process. An analysis of data from 30 further participants, all of whom were current recipients of hearing health care, revealed that the modified tools provided novel clinical information and enabled the identification of clients who were self-managing well in one area but not in another (e.g. wearing hearing aids consistently, but not coping emotionally with the hearing loss).

The capability of the Partners in Health scale and the Cue and Response interview to selectively identify areas of self-management strengths and weaknesses led to the second study. The chronic condition literature conceptualises self-management as a multidimensional construct; the second study aimed to determine to what extent this holds true in the context of hearing rehabilitation. Exploratory factor analysis conducted on the

self-management data from 62 participants revealed three domains of hearing loss self-management: (1) *Knowledge* (knowing about hearing loss and one's rehabilitation options); (2) *Actions* (adhering to treatment, participating in shared decision-making, accessing services and resources, attending appointments, and monitoring for and responding to changes in hearing and functional status); and (3) *Psychosocial Behaviours* (managing the effects of hearing loss on one's social life and emotional wellbeing). Multiple linear regression analyses revealed that each self-management domain was predicted by a different set of personal factors, further strengthening the view of hearing loss self-management as a multidimensional construct.

The third study was designed to determine the potential clinical utility of the Partners in Health scale and the Cue and Response interview by investigating the relationship between hearing loss self-management and hearing aid benefit and satisfaction in a sample of 37 participants, all of whom had worn bilateral hearing aids for 18 months or longer. Significant positive correlations were found between hearing loss self-management in the *Psychosocial Behaviours* and *Actions* domains and specific elements of hearing aid benefit and satisfaction, suggesting that assessment of a client's hearing loss self-management could play an important role in clinical decision-making and management planning.

The fourth and final study focused on self-management support from an audiologist's perspective. Since the nature of the self-management support provided by the clinician has been identified in the chronic condition literature as a key influencer of a client's self-management behaviours, the aim of this study was to probe audiologists' perceptions of self-management among older adults with hearing loss. Data were collected from 11 clinical audiologists across two focus groups and analysed using thematic analysis. The focus group participants described both self-management and self-management support as ongoing, dynamic, multidimensional, and individualised processes in which management strategies are continuously monitored and modified to suit evolving client needs. Hearing loss self-management was also conceptualised as a staged process, with early management strategies serving as precursors or prerequisites to strategies that emerge or are introduced later in the rehabilitation journey. The latter theme is considered a novel contribution to the concept of self-management since it has not been reported previously in the chronic condition literature.

This body of research has deepened our understanding of hearing loss self-management and self-management support and shown that both concepts are relevant to, and important for, the rehabilitation of older adults living with permanent hearing loss. Future research should focus on bridging the gap between research findings and clinical practice in order to improve hearing health care for older adults.

Declaration by author

This thesis *is composed of my original work, and contains* no material previously published or written by another person except where due reference has been made in the text. I have clearly stated the contribution by others to jointly-authored works that I have included in my thesis.

I have clearly stated the contribution of others to my thesis as a whole, including statistical assistance, survey design, data analysis, significant technical procedures, professional editorial advice, financial support and any other original research work used or reported in my thesis. The content of my thesis is the result of work I have carried out since the commencement of my higher degree by research candidature and does not include a substantial part of work that has been submitted *to qualify for the award of any* other degree or diploma in any university or other tertiary institution. I have clearly stated which parts of my thesis, if any, have been submitted to qualify for another award.

I acknowledge that an electronic copy of my thesis must be lodged with the University Library and, subject to the policy and procedures of The University of Queensland, the thesis be made available for research and study in accordance with the Copyright Act 1968 unless a period of embargo has been approved by the Dean of the Graduate School.

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Publications during candidature

Peer-reviewed papers

Keidser, G., & Convery, E. (2016). Self-fitting hearing aids: status quo and future predictions. *Trends in Hearing*, 20, 1-15.

Convery, E., Keidser, G., Seeto, M., & McLelland, M. (2017). Evaluation of the self-fitting process with a commercially available hearing aid. *Journal of the American Academy of Audiology, 28*(2), 109-118.

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Convery, E., Keidser, G., Hickson, L., & Meyer, C. (in press). The relationship between hearing loss self-management and hearing aid benefit and satisfaction. *American Journal of Audiology*.

Conference presentations

Convery, E. Self-fitting hearing aids and online audiology. Keynote presentation at the 2nd International Meeting of Internet and Audiology, Eriksholm Research Centre, Denmark, September 2015.

Convery E., Keidser, G., McLelland, M., & Seeto, M. Left to their own devices: self-fitting hearing aid outcomes among older adults. Poster presentation at the 6th Aging and Speech Communication Conference, Bloomington, Indiana, October 2015.

Convery E., Hickson, L., Meyer, C., & Keidser, G. A service delivery model for self-fitting hearing aids. Oral presentation at the University of Queensland School of Health and Rehabilitation Sciences Postgraduate Research Conference, Brisbane, November 2015.

Convery E., Keidser, G., Hickson, L., & Meyer, C. Thinking beyond the hearing loss: introducing self-management to audiological practice. Oral presentation at the 22nd Audiology Australia National Conference, Melbourne, May 2016.

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Convery, E., Hickson, L., Meyer, C., & Keidser, G. Self-fitting hearing aids: issues of candidacy and support. Oral presentation at the University of Queensland School of Health and Rehabilitation Sciences Postgraduate Research Conference, Brisbane, November 2016.

Convery, E., & Keidser, G. Left to their own devices? What the evidence tells us about self-fitting hearing aids. Keynote presentation at the 44th Annual American Auditory Society Scientific and Technology Meeting, Scottsdale, Arizona, March 2017.

Convery, E., & Keidser, G. Meeting current and future challenges: the evolution of user control and its impact on service delivery. Invited presentation at Cutting-Edge Perspectives in Service Delivery for Older Adults, ASHA Audiology Online Conference, October 2017.

Convery, E., & Keidser, G. Audiologists and self-fitting hearing aids: should we “swipe right” on this new technology? Keynote lecture at the 14th Annual British Academy of Audiology Conference, Bournemouth, UK, November 2017.

Convery, E., Meyer, C., Keidser, G., & Hickson, L. What diabetes, arthritis, and asthma can teach us about managing a hearing loss. Invited presentation at the Science Space Lecture Series, National Institute for Hearing Research, Nottingham, UK, November 2017.

Convery, E., Meyer, C., Keidser, G., & Hickson, L. What diabetes, arthritis, and asthma can teach us about managing a hearing loss. Opening address at Making Contemporary Clinical Audiological Decisions: Teams, Technologies and Timing, Independent Audiologists Australia Seminar, Sydney, March 2018.

Convery, E., Keidser, G., Hickson, L., & Meyer, C. Factors associated with successful self-fitting and the need for personalised clinical support. Oral presentation at the 23rd Audiology Australia National Conference, Sydney, May 2018.

Convery, E., Meyer, C., Keidser, G., & Hickson, L. “The audiologist needs to hear what I need”: assessment of hearing loss self-management in older adults. Poster presentation and short communication at the 23rd Audiology Australia National Conference, Sydney, May 2018.

Convery, E., & Keidser, G. Self-fitting hearing aids: insights from (almost) a decade of evidence. Invited panel presentation at the 34th World Congress of Audiology, Cape Town, October 2018.

Non-peer reviewed papers

Convery, E., Keidser, G., Hickson, L., & Meyer, C. (2016). Beyond hearing loss: self-management in audiological practice. *Hearing Journal*, 69*(3)*, 22-28.

Keidser, G., & Convery, E. (2016). Preliminary observations on outcomes with a self-fitted hearing aid. *Hearing Journal*, 69*(11)*, 34-38.

Publications included in this thesis

Four peer-reviewed journal articles (published or in press) are included in their entirety in the thesis.

Convery, E., Hickson, L., Keidser, G., & Meyer, C. (2019). The Chronic Care Model and chronic condition self-management: an introduction for audiologists. *Seminars in Hearing, 40*(1), 7-25. Incorporated as Chapter 2.

Contributor	Statement of contribution
Elizabeth Convery (Candidate)	Conception and design (85%) Analysis and interpretation (70%) Drafting and production (80%)
Louise Hickson	Conception and design (5%) Analysis and interpretation (10%) Drafting and production (10%)
Gitte Keidser	Conception and design (5%) Analysis and interpretation (10%) Drafting and production (5%)
Carly Meyer	Conception and design (5%) Analysis and interpretation (10%) Drafting and production (5%)

Convery, E., Meyer, C., Keidser, G., & Hickson, L. (2018). Assessing hearing loss self-management in older adults. *International Journal of Audiology, 57*(4), 313-320. Incorporated as Chapter 3.

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Gitte Keidser	Conception and design (5%) Analysis and interpretation (15%) Drafting and production (5%)
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Louise Hickson	Conception and design (5%)

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Gitte Keidser	Conception and design (5%) Analysis and interpretation (10%) Drafting and production (5%)
Carly Meyer	Conception and design (5%) Analysis and interpretation (10%) Drafting and production (5%)

Contributions by others to the thesis

The PhD candidate was primarily responsible for designing the research, obtaining ethical approval to conduct each study, recruiting participants, collecting the data, performing statistical analysis, interpreting the data, and writing each chapter.

Prof. Louise Hickson and Dr. Carly Meyer of the University of Queensland and Dr. Gitte Keidser of the National Acoustic Laboratories each had substantial input into conceptualising and designing the research, interpreting the data, and critically appraising the written work.

Mark Seeto of the National Acoustic Laboratories provided statistical guidance for the analyses reported in chapters 4 and 5. Katrina Freeston of the National Acoustic Laboratories acted as the assistant facilitator for the focus groups discussed in chapter 6.

Statement of parts of the thesis submitted to qualify for the award of another degree

None

Research involving human or animal subjects

The studies described in chapters 3 and 4 were approved by the Australian Hearing Human Research Ethics Committee (AHHREC2016-4; 2016-10) and the University of Queensland Medical Research Ethics Committee (2016000447).

The study described in chapter 5 was approved by the Australian Hearing Human Research Ethics Committee (AHHREC2018-1) and the University of Queensland Medical Research Ethics Committee (2018000031).

The study described in chapter 6 was approved by the Australian Hearing Human Research Ethics Committee (AHHREC2018-11) and the University of Queensland Medical Research Ethics Committee (2018000789).

Copies of the ethics approval letters appear in Appendices C and D.

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It has been a pleasure and a privilege to learn from each of my supervisors over the past four years. The diverse but complementary perspectives of Prof. Louise Hickson, Dr. Carly Meyer, and Dr. Gitte Keidser have added greatly to the depth and rigour of my research. I particularly appreciated their flexibility when my original research topic spun off in an unexpected yet fruitful new direction.

Prof. Sharon Lawn of the Flinders Human Behaviour and Health Research Unit at Flinders University kindly permitted me to adapt the Partners in Health scale and the Cue and Response interview from the Flinders Chronic Condition Management Program™ for audiological use. I thank her for her enthusiastic and ongoing support of our work.

The importance of the 91 research participants and 11 audiologists who generously gave of their time to take part in the studies described in this thesis cannot be overstated. Very little applied research in audiology can be conducted without human participants, and I gratefully acknowledge the valuable contributions of each and every one of them to this thesis.

The National Acoustic Laboratories have been my home since 2002 in more ways than one. NAL has provided me with world-class laboratory facilities, colleagues with a dizzying array of knowledge and skills, research opportunities beyond my wildest imagination, and a husband who cooks a mean spaghetti bolognaise. I thank each of my colleagues – particularly the one I'm married to – for their support during my PhD.

My parents, Herb and Paulette Convery, have always been unflagging supporters of all that I do, including but not limited to my sudden departure for Australia on a one-way ticket at the age of 24 and my decision to pursue a PhD at the age of 39. I know that the title page of this thesis will have pride of place on their refrigerator door, and I look forward to the next time I can see it in person.

This thesis would not exist without my aforementioned husband, Scott Brewer. From performing percussive maintenance on my ageing computer to making late-night diet Coke runs, from cat-wrangling to periodically reminding me what month it is, Scott has been there for me every step of the way. And speaking of family, I would also like to

acknowledge the contribution of our cats, Linux and Eartha, to this thesis. Their penchant for lounging in, on, and around my notes gives new meaning to being “on top of the literature.”

One final special note: the inspiration for my thesis came not only from my work as an audiologist, but also from my experiences on the other side of the desk. Like the clinical population I serve, I also live with a chronic health condition. While I do my best to self-manage – and fully appreciate what a challenge that can be – I could not have achieved my current quality of life without the dedicated and compassionate care of Dr. R.W.L., Dr. M.D.F., Dr. C.K., and Dr. M.S. Each of these highly skilled physicians exemplifies what the Chronic Care Model refers to as a “prepared, proactive practice team.” Their “productive interactions” with me – the (hopefully) “informed, activated patient” – have helped me to achieve the best possible quality of life, which in turn has enabled me to complete this thesis.

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Keywords

chronic health conditions, chronic condition management, hearing health care, hearing loss, older adults, self-management, self-management support

Australian and New Zealand Standard Research Classifications (ANZSRC)

ANZSRC code: 110321, Rehabilitation and Therapy (excl. Physiotherapy), 100%

Fields of Research (FoR) Classification

FoR code: 1103, Clinical Sciences, 100%

Dedication

This thesis is dedicated to Dr. Christine Gilmore Eubanks: audiologist, mentor, and friend. Christine unwittingly set me on my current career path back in 1999 when she was my internship supervisor at the John Tracy Clinic in Los Angeles. One day she spotted an ad for audiology positions in the Northern Territory and forwarded it to me with the comment, “Wouldn’t it be an adventure to go work in Australia?” It certainly has been so far!

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List of Abbreviations

4FA = four-frequency average

ACE = Active Communication Education

APHAB = Abbreviated Profile of Hearing Aid Benefit

CCM = Chronic Care Model

CDSMP = Chronic Disease Self-Management Program

HHC = hearing health care

HLSM = hearing loss self-management

HRQoL = health-related quality of life

ICF = International Classification of Functioning, Disability and Health

SADL = Satisfaction with Amplification in Daily Life

TDF = Theoretical Domains Framework

Chapter 1. Introduction

1.1 Research significance

Permanent sensorineural hearing loss is a disorder of the ear characterised by a reduction in auditory sensitivity, impaired frequency selectivity, and abnormally broad cochlear filters, which together give rise to a reduced ability to detect a signal in a background of noise, particularly at low levels (Moore, 2003). It is the most prevalent sensory impairment (Mathers, Smith, & Concha, 2003) and the third leading cause of years lost to disability worldwide (Vos et al., 2016). Hearing loss is a chronic health condition with effects that extend beyond the auditory system and into the domains of communicative, psychosocial, and cognitive functioning (Chia et al., 2007; Gopinath et al., 2011; Kramer, Kapteyn, Kuik, & Deeg, 2002). Despite the significant and wide-ranging consequences of untreated hearing loss, only a minority of adults seek help for their hearing difficulties and take up hearing rehabilitation (Bainbridge & Ramachandran, 2014; Popelka et al., 1998).

There is emerging evidence that the nature of the hearing health care (HHC) system may contribute to low rates of hearing help-seeking and rehabilitation uptake and use (Ekberg, Grenness, & Hickson, 2014; Kelly et al., 2013; Poost-Foroosh, Jennings, Shaw, Meston, & Cheesman, 2011; Pryce, Hall, Laplante-Lévesque, & Clark, 2016). HHC has been described as biomedically focused, device-centred, and clinician-led (Ekberg et al., 2014; Grenness, Hickson, Laplante-Lévesque, Meyer, & Davidson, 2015; Pryce et al., 2016), all of which are common features of health care systems designed to address acute, rather than chronic, health conditions. Research from the wider chronic condition literature further suggests that acute-focused care can result in suboptimal outcomes for individuals with chronic conditions since functional changes are unlikely to be monitored and addressed over time; clients are encouraged to be passive recipients of treatment, rather than active participants in their care; and the psychosocial effects of the chronic condition are rarely considered when developing a treatment plan (Von Korff, Gruman, Schaefer, Curry, & Wagner, 1997; Wagner, Austin, & Von Korff, 1996).

The research described in this thesis uses this evidence base as a rationale for exploring an alternative service delivery model as a means to improve the uptake of HHC and outcomes for older adults with hearing loss. The Chronic Care Model (CCM) is a multidimensional organisational framework that describes best-practice clinical care for

chronic conditions and has been implemented around the world as a model for diabetes, mental illness, and arthritis care (Wagner et al., 1996). Crucially, the CCM is designed to empower individuals to self-manage their chronic condition more effectively (Coleman, Austin, Brach, & Wagner, 2009; Taylor et al., 2014). A review of the CCM's effectiveness in clinical practice found that the provision of self-management support was arguably the most critical component of the model, with all but one of the studies included in the review demonstrating improvements in client outcomes when self-management support was part of the care they received (Bodenheimer, 2003; Coleman et al., 2009). Self-management refers to the roles and responsibilities of the individual in managing his or her chronic condition, whereas self-management support refers to the roles and responsibilities of the clinician in ensuring that these skills are acquired and applied (Lawn & Schoo, 2010; Von Korff et al., 1997). This thesis focuses specifically on the complementary roles of self-management and self-management support in the context of hearing rehabilitation for older adults.

1.2 Research aims

The broad aim of this research is to investigate the applicability of a chronic care framework to HHC for older adults, with a focus on the complementary roles of self-management and self-management support.

The specific aims are to:

1. Determine whether a pair of existing, validated clinical tools for the assessment of chronic condition self-management could be modified for use with older adults with hearing loss
2. Determine whether the modified tools yielded clinical information that was not currently being gathered with the standard audiological test battery
3. Identify the individual domains of hearing loss self-management (HLSM) and compare them to those that have been identified as applicable to other chronic conditions
4. Identify predictors of HLSM in each of the identified domains
5. Investigate the relationship between HLSM and hearing aid outcomes
6. Explore audiologists' understanding of HLSM and the extent to which it is supported in current clinical practice

1.3 Thesis structure

The thesis is a linked series of articles that have each been published by peer-reviewed journals. Each article is reproduced here as published, with the exception of minor edits to address the comments of the thesis examiners; formatting changes to the headings, tables, and references; and the use of Australian spelling and vocabulary conventions to maintain consistency throughout the thesis.

Chapter 2 introduces the CCM and the concepts of self-management and self-management support. This chapter reviews the current literature on the relationship between the provision of effective self-management support and clinical outcomes and explores validated methods to support the acquisition and application of self-management skills in a clinical population. The extent to which elements of self-management and self-management support have already made inroads into audiological practice is discussed and the gaps in the evidence base are identified. This chapter was published in *Seminars in Hearing* in 2019 and is included here in its entirety.

Chapter 3 addresses one of the gaps identified in the literature review: the lack of a validated method of assessing HLSM in older adults. A pair of self-management assessment tools from the Flinders Chronic Condition Management Program™, the Partners in Health scale and the Cue and Response interview, were modified in an iterative process with a pilot group of seven older adults with hearing loss. Chapter 3 describes both the process of modification and the outcomes when the tools are used to assess HLSM in a sample of 30 current recipients of HHC. This chapter was published in the *International Journal of Audiology* in 2017 and is included here in its entirety.

Chapter 4 presents the results of an exploratory factor analysis conducted on HLSM assessment data collected from 62 older adults with hearing loss. Individual domains of HLSM were identified and compared to those previously identified for other chronic conditions. The relationship between each HLSM domain and a range of personal factors – health literacy, health locus of control, social support, problem-solving skills, cognitive function, hearing aid self-efficacy, age, gender, and HHC experience – was determined with multiple linear regression. This chapter introduces the International Classification of Functioning, Disability and Health (ICF; World Health Organization, 2001) and embeds the

research within this theoretical framework. This chapter was published in *Disability and Rehabilitation* in 2018 and is included here in its entirety.

The research presented in Chapter 5 aimed to determine the clinical utility of an HLSM assessment by establishing a link between hearing aid benefit and satisfaction and the individual domains of HLSM identified in Chapter 4. To achieve this aim, HLSM and hearing aid outcomes data were collected from a sample of 37 older adults with bilateral hearing aid experience and analysed using correlation analysis. This chapter has been accepted for publication in the *American Journal of Audiology* and is included here in its entirety.

Chapter 6 reports on the results of a qualitative study undertaken to explore audiologists' understanding of HLSM and the extent to which they believe HLSM support is provided by the Australian HHC system. Data were collected from 11 clinical audiologists across two focus groups and analysed using thematic analysis. The nominal group technique (Gallagher, Hares, Spencer, Bradshaw, & Webb, 1993) was employed to identify the specific aspects of HLSM the focus group participants believed should be the highest priority to address in further research and clinical tool development.

Chapter 7 presents an overview of the research findings, discusses the strengths and limitations of the work, and explores potential avenues for future research and clinical implementation.

All studies conducted as part of this thesis were approved by and conducted under the ethical oversight of the Australian Hearing Human Research Ethics Committee and the University of Queensland Medical Research Ethics Committee and conformed in all respects to the Australian government's National Statement on Ethical Conduct in Human Research (National Health and Medical Research Council, 2007).

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Chapter 2. The Chronic Care Model and chronic condition self-management: an introduction for audiologists

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2.1 Abstract

Hearing health care is biomedically focused, device-centred, and clinician-led. There is emerging evidence that these characteristics – all of which are hallmarks of a health care system designed to address acute, rather than chronic, conditions – may contribute to low rates of help-seeking and hearing rehabilitation uptake among adults with hearing loss. In this review, we introduce audiologists to the Chronic Care Model, an organisational framework that describes best-practice clinical care for chronic conditions, and suggest that it may be a viable model for hearing health care to adopt. We further introduce the concept of chronic condition self-management, a key component of chronic care that refers to the knowledge and skills clients use to manage the effects of a chronic condition on all aspects of daily life. Drawing on the chronic condition evidence base, we demonstrate a link between the provision of effective self-management support and improved clinical outcomes and discuss validated methods with which clinicians can support the acquisition and application of self-management skills in their clients. We examine the extent to which elements of chronic condition self-management have been integrated into clinical practice in audiology and suggest directions for further research in this area.

2.2 Introduction

Only a minority of adults with hearing loss seek help for their hearing problems and take up hearing rehabilitation (Bainbridge & Ramachandran, 2014; Nash et al., 2013; Popelka et al., 1998). The majority of the research into hearing help-seeking, hearing aid and aural rehabilitation uptake, and hearing aid retention and use has focused on the individual client characteristics, attitudes, and beliefs that are associated with these behaviours (Knudsen, Öberg, Nielsen, Naylor, & Kramer, 2010; Laplante-Lévesque, Hickson, & Worrall, 2010a; Meyer, Hickson, Lovelock, Lampert, & Khan, 2014; Saunders, Chisolm, & Wallhagen, 2012; Saunders, Frederick, Silverman, Nielsen, & Laplante-Lévesque, 2016). However, there is emerging evidence that the characteristics of the hearing health care (HHC) system itself – which has a biomedical focus, emphasises technological interventions, and typically aligns with a clinician-led style of client care – also contribute to low rates of hearing help-seeking and rehabilitation uptake and use (Ekberg, Grenness, & Hickson, 2014; Kelly et al., 2013; Poost-Foroosh, Jennings, Shaw, Meston, & Cheesman, 2011; Pryce, Hall, Laplante-Lévesque, & Clark, 2016). In this review, we examine this evidence and use it as a rationale for exploring the feasibility of an alternative model of service delivery in order to improve HHC utilisation and client outcomes. The review is structured around the following questions: What are the characteristics of the existing HHC service delivery model? What are the implications of viewing hearing loss within the context of a service delivery model designed to serve clients with chronic conditions? What are the key components of such a model? What is the evidence for chronic condition self-management and its effect on client outcomes? To what extent have these principles already made inroads into HHC, and how can we build on that foundation in future research?

2.3 How is adult hearing rehabilitation currently delivered?

Hearing loss is the most prevalent sensory impairment (Mathers, Smith, & Concha, 2003) and the third leading cause of years lost to disability worldwide (Vos et al., 2016; World Health Organization, 2008). Disabling hearing loss, defined by the World Health Organisation as a four-frequency average (4FA; average of pure-tone thresholds at 0.5, 1, 2, and 4 kHz) that exceeds 40 dB HL in the better ear, is estimated to affect 538 million people globally over the age of 15 years (Stevens et al., 2013). Hearing loss has a wide range of significant consequences beyond a reduction in peripheral auditory sensitivity and

frequency resolution. Among older adults, hearing loss is associated with such psychosocial effects as depression (Cacciatore et al., 1999; Kramer, Kapteyn, Kuik, & Deeg, 2002; Strawbridge, Wallhagen, Shema, & Kaplan, 2000; Wong & Cheng, 2012), isolation and social withdrawal (Kramer et al., 2002; Weinstein & Ventry, 1982; Wong & Cheng, 2012), somatisation (Eriksson-Mangold & Carlsson, 1991), and cognitive impairment (Appollonio, Carabellese, Frattola, & Trabucchi, 1996; Bainbridge & Wallhagen, 2014; Cacciatore et al., 1999; Lin, 2011). Studies of older adults have further demonstrated that individuals with bilateral hearing loss have poorer physical health-related quality of life (HRQoL) than do those with normal hearing, and that self-reported physical HRQoL declines as the degree of hearing loss increases (Chia et al., 2007; Dalton et al., 2003). Among adults of working age, hearing loss is additionally associated with poorer levels of educational attainment, diminished vocational prospects, and reduced earning power over the lifespan (Access Economics, 2006; Dalton et al., 2003; Olusanya, Ruben, & Parving, 2006; Shield, 2006).

The standards of care endorsed by leading professional bodies acknowledge the wide-ranging effects of hearing loss and thus recommend a comprehensive and multidimensional care process with consideration given to the client's physiological, communicative, behavioural, and psychosocial needs (American Speech-Language-Hearing Association, 2006; Audiology Australia, 2013; British Society of Audiology, 2016). In practice, however, disproportionate attention is paid to the biomedical nature of the hearing loss at nearly every stage of the clinical pathway, beginning with the initial clinical encounter. Grenness, Hickson, Laplante-Lévesque, and Meyer (2014) examined client-audiologist interaction patterns by recording and analysing 63 initial consultations. Communication dynamics were analysed with the Roter Interaction Analysis System, a quantitative method grounded in the idea that client-clinician dialogue shapes the therapeutic relationship and provides insight into the nature of that relationship, particularly with respect to issues of power, control, and informational exchange (Roter & Larson, 2002). Grenness et al. (2014) reported that the case histories obtained by the audiologists in that study tended to be weighted toward the identification of underlying biomedical issues, such as past episodes of otalgia or otitis media. Proportionally fewer questions pertaining to the client's psychosocial or functional difficulties were posed, which may communicate to the client at the outset that the problems arising from hearing loss should be defined primarily in biomedical terms.

The application of a biomedical framework to the clinical decision-making process is reaffirmed throughout subsequent clinical activities (Ekberg et al., 2014; Grenness, Hickson, Laplante-Lévesque, Meyer, & Davidson, 2015; Meyer, Barr, Khan, & Hickson, 2017). Not only is a large proportion of the initial assessment devoted to quantifying the degree, type, and symmetry of a client's hearing loss, but two recent studies have demonstrated that the results of the assessment also tend to be communicated to the client in predominantly biomedical terms (Grenness et al., 2015; Meyer et al., 2017). In those studies, clinicians typically explained the diagnosis of hearing loss to their clients by describing the audiogram, rather than by discussing its functional and psychosocial implications. A recent study conducted by Ekberg et al. (2014) suggested that the clinician's view of hearing loss as a primarily biomedical concern is at odds with the way clients perceive their own hearing difficulties. In that study, the corpus of 63 client-audiologist interactions from Grenness et al. (2014) were analysed with conversational analysis, a technique in which both verbal and non-verbal communication is examined with the aim of understanding social interaction. Ekberg et al. (2014) reported that clients routinely raise psychosocial concerns of their own volition within a typical clinical encounter, and will persist in doing so even in the face of efforts by the audiologist to redirect the conversation toward a discussion of hearing aids. Indeed, the psychosocial and functional issues arising from hearing loss have been shown in many studies to be among the major drivers of help-seeking (Carson, 2005; Claesen & Pryce, 2012; Duijvestijn et al., 2003; Laplante-Lévesque, Knudsen, et al., 2012; Meyer et al., 2014; Saunders et al., 2016). Further, Ekberg et al. (2014) found that when psychosocial concerns were left unaddressed by the audiologist, the client often declined hearing aids. Even if the client did agree to take up amplification, which was often the case for the clients in that study whose hearing aids were subsidised by a government program, clients who did not have their psychosocial concerns addressed by the audiologist expressed less commitment to hearing aid use, leading the authors to speculate that clinician behaviour could have consequences for longer-term hearing aid use and retention.

A robust body of research has established that at least for clients with mild to moderately severe hearing loss, hearing aids are a cost-effective intervention (Chao & Chen, 2008; Joore, van der Stel, Peters, Boas, & Anteunis, 2003) that reduce activity limitations and participation restrictions and improve HRQoL (Chisolm et al., 2007; Vuorialho, Karinen, & Sorri, 2006; World Health Organization, 2001). However, hearing aids alone do not adequately address the full range of difficulties that can arise from a hearing loss,

particularly those of a psychosocial nature. Aural rehabilitation, counselling, and communication programs are all examples of non-technological interventions in HHC whose positive outcomes are supported by evidence (Hickson, Worrall, & Scarinci, 2007b; Kramer, Allessie, Dondorp, Zekveld, & Kapteyn, 2005; Preminger & Yoo, 2010; Thorén, Öberg, Wänström, Andersson, & Lunner, 2014), but they are not routinely offered by audiologists (Laplante-Lévesque, Hickson, & Worrall, 2010b). Conversational analysis of client-clinician communication patterns has demonstrated that audiologists tend to couch their rehabilitative recommendations almost exclusively in terms of the technological benefits of hearing aids, irrespective of the client's interest in, or receptivity to, that option (Ekberg et al., 2014). Studies that have investigated the client's perception of HHC services confirm these findings. Despite the fact that there is greater acceptance of an intervention when the client is offered the opportunity to choose from a range of options (Laplante-Lévesque, Hickson, & Worrall, 2011, 2012), hearing aids are often the sole intervention offered by audiologists, with individual client preferences rarely explored (Kelly et al., 2013; Pryce et al., 2016). The focus on technology means that counselling in an audiological rehabilitation context becomes more informational than empathic, with an emphasis on teaching the client how to manage the practical aspects of using hearing aids rather than ensuring the client acquires the skills necessary to manage the hearing loss and its functional and psychosocial effects more broadly (Ekberg et al., 2014; Pryce et al., 2016). The consequences of informationally focused counselling were explored by Kelly et al. (2013), who convened a series of eight client focus groups to determine what kind of support clients thought was necessary to become a successful hearing aid user and the extent to which they believed they had received such support from the HHC professionals they encountered. The 31 older adults with hearing loss who participated in the focus groups, approximately half of whom were experienced hearing aid users, perceived deficiencies in their care both pre- and post-fitting. In particular, they highlighted a need for professional support in managing the psychosocial issues associated with hearing loss, such as coming to terms with and accepting the loss, and navigating the functional aspects of living with a hearing loss, such as acclimatising to the presence of new sounds and employing communication strategies in challenging listening environments.

Many aspects of the clinician-client relationship described above – most notably the clinician's agenda taking precedence over the client's individual goals and the lack of shared decision-making when choosing a rehabilitation strategy – suggest that clinical practice in audiology is clinician-led rather than client-centred. Client-centred care refers to

the idea that it is the client, not the health condition, who is being treated (World Health Organization, 2007). Client-centred care is conceptualised as an equal partnership between the client and clinician in which health care is provided in a “holistic, individualised, respectful, and empowering” manner (Morgan & Yoder, 2012). It is diametrically opposed to a paternalistic, clinician-led style of practice, in which the client is largely a passive recipient of treatment. Surveys conducted in Australia (Laplante-Lévesque, Hickson, & Grenness, 2014), Portugal (Manchaiah, Gomersall, Tomé, Ahmadi, & Krishna, 2014), India (Manchaiah et al., 2014), Iran (Manchaiah et al., 2014), and Malaysia (Ali, Meyer, & Hickson, 2018) have revealed that while audiologists express an overall preference for, and theoretical understanding of, client-centred care, they do not necessarily practice in accordance with this belief. For example, participants in Kelly et al.’s (2013) client focus groups frequently described clinical encounters in which the audiologist implicitly assumed that they would take up hearing aids, rather than explicitly soliciting their views. The power imbalance in the clinician-client relationship may have meant that clients thus felt pressured to accept the audiologist’s recommendation, regardless of their actual willingness to take up and use hearing aids. Even clinical practice that appears client-centred may, in fact, not be. Pryce et al. (2016) observed six clinician-client dyads and analysed their interactions using a constant comparison method of grounded theory, an inductive process in which concepts and theory are informed by the data collected. They found that the majority of clinicians explicitly invited client participation in the decision-making process. However, the audiologists provided no pertinent information upon which the client was expected to base intervention decisions beyond the audiologist’s own views, thus biasing the decision in favour of the audiologist’s recommendation. Further, the client’s willingness to pursue hearing rehabilitation was often interpreted by the audiologist as a preference specifically for hearing aids.

What are the consequences of clinician-led practice in audiology? Poost-Foroosh et al. (2011) convened a series of client and clinician focus groups in which participants were invited to identify aspects of clinical practice they believed would influence hearing aid uptake. Twelve clients and seven audiologists took part in an initial brainstorming session in which a list of potential factors was generated; a group of 11 clients and 10 audiologists, some of whom had participated in the brainstorming session, sorted and rated the list of factors according to theme and perceived importance. Following initial analysis of the data by the experimenters, four clients and three audiologists, all of whom had participated in at least one of the previous sessions, assisted with interpreting and naming the themes that

had been developed in the second session. Clients and clinicians both reported that the likelihood of hearing aid uptake would increase if the clinician valued what was important to the client, tailored rehabilitation recommendations to the needs of the individual client, and worked to build rapport with the client, all of which are characteristics of client-centred care. While the relationship between client-centred care and client outcomes in an audiological context is not yet fully understood, studies conducted in other areas of health care have demonstrated that client-centred care improves adherence to the recommended treatment or rehabilitation strategy (Michie, Miles, & Weinman, 2003; Stewart, 1984), client satisfaction with the clinical encounter (Michie et al., 2003; Ong, de Haes, Hoos, & Lammes, 1995; Wolf, Lehman, Quinlin, Zullo, & Hoffman, 2008), health outcomes (Kaplan, Greenfield, & Ware, 1989; Stewart et al., 2000), and quality of life (Kinmonth, Woodcock, Griffin, Spiegal, & Campbell, 1998).

The three themes of current clinical practice in audiology – the application of a biomedical framework to the assessment and management of hearing loss, the lack of rehabilitative choices offered to the client, and the provision of clinician-led rather than client-centred care – are all hallmarks of a health care system designed to address acute health conditions on an episodic basis (Wagner et al., 2001). Indeed, participants in an international study of clients' views of hearing help-seeking and rehabilitation characterised their interactions with the HHC system as "isolated events rather than chronologically ordered steps… relating to a common goal" (Laplante-Lévesque, Knudsen, et al., 2012), despite the frequent conceptualisation of hearing rehabilitation in the audiology literature as a "journey." In the next section, we distinguish between acute and chronic conditions and introduce a clinical service delivery model that is specifically designed to address the latter.

2.4 What is the Chronic Care Model?

The Chronic Care Model (CCM) was developed in response to the paradigm of service delivery that dominated much of twentieth-century health care, which, with its focus on acute and urgent illness, was ill-equipped to deal with the needs of individuals with chronic conditions (Wagner et al., 2001). Chronic conditions are those that are experienced on a long-term or permanent basis (Von Korff, Gruman, Schaefer, Curry, & Wagner, 1997) and whose effects are merely controllable, rather than curable (Bernstein et al., 2003; World Health Organization, 2002). The need for ongoing treatment and management is another

key aspect of living with a chronic condition, which may take the form of medical intervention, rehabilitation services, assistive devices, personal assistance, or a combination of these (Bernstein et al., 2003; Friedman, Jiang, & Elixhauser, 2008; Stein, Bauman, Westbrook, Coupey, & Ireys, 1993). While chronic conditions have traditionally been thought of as referring only to physically disabling or life-threatening illnesses, such as arthritis, asthma, and diabetes, the definition also encompasses conditions that have a "psychological or cognitive basis" (Stein et al., 1993) as well as those, like hearing loss, that produce impairments in sensory and communicative function (Perrin et al., 1993). Within a traditional model of health care, complications and declines associated with a chronic condition may not be reliably detected; clients are encouraged to be passive recipients of treatment, rather than active participants; and the psychosocial effects of the chronic condition are rarely taken into account. As a result, an acute-focused strategy can result in suboptimal health outcomes for many individuals with chronic conditions (Von Korff et al., 1997; Wagner, Austin, & Von Korff, 1996).

In contrast, the CCM (Figure 2-1) emphasises a collaborative relationship between clinicians and clients in which health care and self-care are viewed as complementary, rather than competing (Von Korff et al., 1997). Wagner, Davis, Schaefer, Von Korff, and Austin (2002) characterised this relationship as "productive interactions [between the] informed, activated patient [and the] prepared, proactive practice team." Six elements are included in the model: the community, the health system, delivery system design, decision support, clinical information systems, and self-management support. The inclusion of the health system in the model highlights the fact that quality care for individuals with chronic conditions requires organisational support, rather than just interventions on an individual clinician or client level (Coleman, Austin, Brach, & Wagner, 2009; Wagner et al., 1996). The four components of the health system – delivery system design, decision support, clinical information systems, and self-management support – refer to the clinical infrastructure required to deliver effective chronic condition care. The community component complements the health system by supporting or expanding upon the delivery of chronic care through community programs and advocacy groups. The CCM is not specific to a particular chronic condition; instead, it emphasises commonalities of experience across a wide range of conditions and individuals and is in line with the assertion that "whether manifestations are primarily physical or psychosocial, essentially all chronic conditions present a common set of challenges to the sufferers and their families" (Wagner et al., 2001).

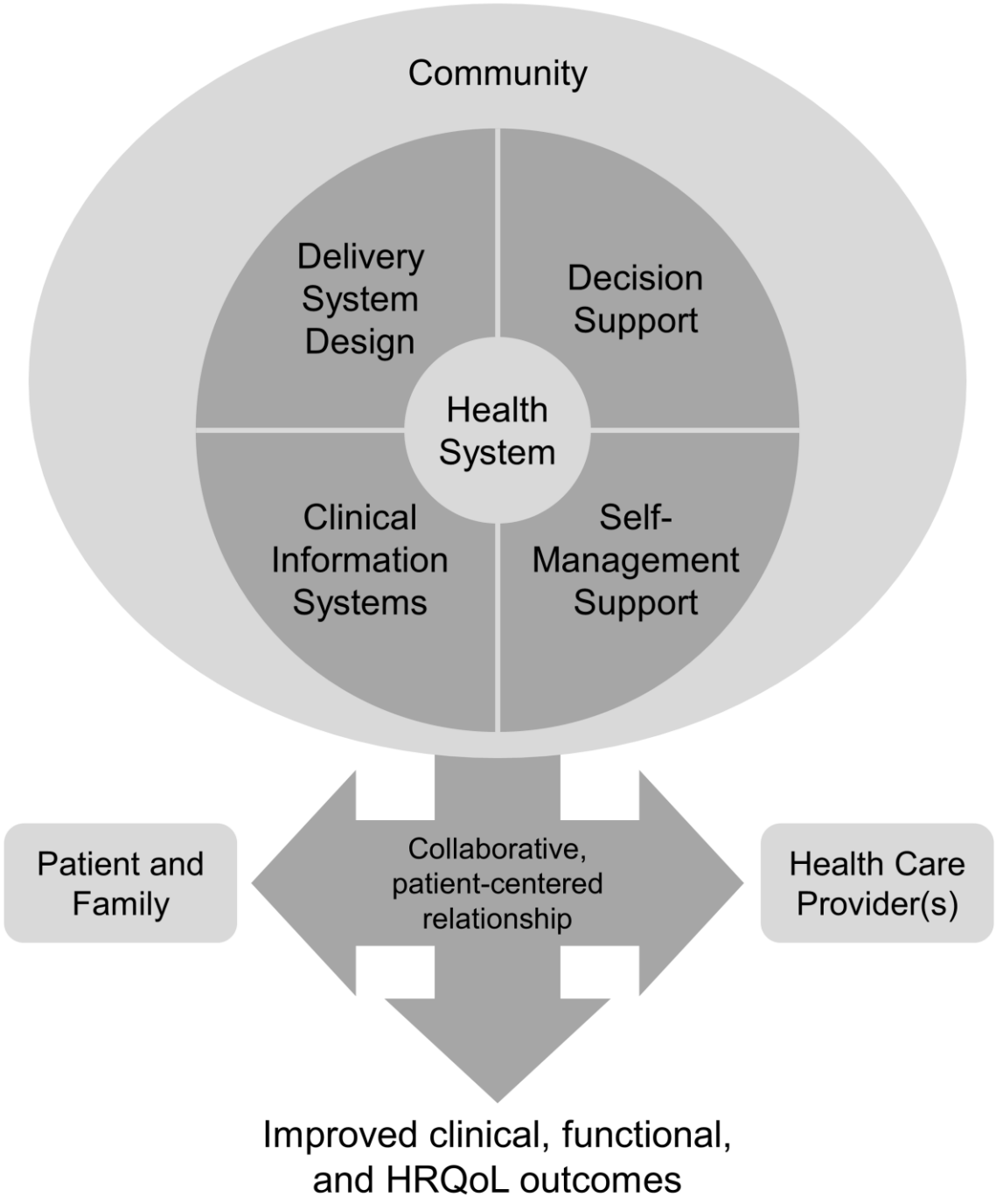

Figure 2-1. The Chronic Care Model

In a review of the CCM's effectiveness in clinical practice, Bodenheimer (2003) found that while no individual element is essential to the model, self-management support was arguably the most critical. Of the studies included in that review, all but one demonstrated improvement in client outcomes when self-management support was a component of chronic condition care, regardless of the presence or absence of the other elements of the model. An important distinction must be drawn between the terms self-management and

self-management support. Self-management refers to the roles and responsibilities of the client in managing his or her chronic condition, whereas self-management support refers to the roles and responsibilities of the clinician in ensuring that these skills are acquired and applied (Von Korff et al., 1997; Wagner et al., 2001). In the next two sections, we explore the concepts of self-management and self-management support in more depth.

2.5 What is chronic condition self-management?

Self-management refers, broadly, to everything a client knows and does to manage the effects of a chronic condition on his or her overall quality of life (Bodenheimer, Lorig, Holman, & Grumbach, 2002; Clark et al., 1991). Despite the seeming simplicity of this statement, self-management is a complex, multidimensional concept and there is no consensus on its precise definition or conceptual boundaries. One of the most comprehensive definitions, and thus a useful starting point, is that of Barlow, Wright, Sheasby, Turner, and Hainsworth (2002), who define self-management as

> the individual's ability to manage the symptoms, treatment, physical and psychosocial consequences, and lifestyle changes inherent in living with a chronic condition… to monitor one's condition; and to effect the cognitive, behavioural, and emotional responses necessary to maintain a satisfactory quality of life. Thus, a dynamic and continuous process of self-regulation is established. (p. 178)

The reference to self-regulation highlights the definition's grounding in Bandura's social cognitive theory (Bandura, 1991, 2001). Social cognitive theory describes the triadic interaction between personal (i.e. cognitive, affective, and biological), behavioural, and environmental factors that gives rise to the acquisition and maintenance of behavioural patterns. The theory states that each factor continuously and dynamically affects the other factors in the triad, a relationship referred to as reciprocal determinism (Bandura, 1978). Within the theory, individuals are therefore viewed as proactive, rather than reactive, and capable of self-reflection and self-regulation. Social cognitive theory has been widely adopted in health care because it provides three possible avenues – personal, behavioural, and environmental – via which an intervention strategy can be delivered, with the expectation that the benefits of the intervention will then flow to the other domains (Bandura, 2004). Barlow et al.'s (2002) definition makes explicit the idea that self-management does not refer solely to the skills necessary to manage a condition-specific intervention, such as the ability to inject oneself with insulin or to use and manage a hearing aid. Rather, self-management encompasses the broader range of knowledge,

skills, and behaviours necessary to manage the effects of the chronic condition on all aspects of one's life (National Health Priority Action Council, 2006; World Health Organization, 2002). In other words, self-management skills are necessarily multidimensional – encompassing physical, social, psychological, cognitive, behavioural, and emotional domains – since the effects of a chronic condition also extend to these areas. Finally, Barlow et al.'s (2002) definition describes self-management as a process. Since chronic conditions are long-term or even lifelong experiences, so too are the strategies and actions necessary for its successful management (Lawn & Schoo, 2010).

A further addition to the concept of self-management is the idea that all chronic conditions are self-managed with a common or "generic" set of skills, regardless of the underlying physiological impairments caused by different conditions. This theory was first proposed by Clark et al. (1991), who reviewed the self-management literature for five chronic conditions: heart disease, asthma, chronic obstructive pulmonary disease, arthritis, and diabetes. The review identified a set of self-management tasks that all five conditions had in common, including ongoing use and management of the prescribed intervention, maintaining physical and emotional health, monitoring for and responding to changes in condition severity, information- and support-seeking, and interacting with health care providers. Clark et al. (1991) noted that while the specific task may vary (e.g. using an inhaler for asthma but insulin injections for diabetes), the "essential nature" of the task (i.e. managing the medical aspects of the condition) remains the same. At the time of the review, very few studies had examined self-management within a mixed population, but since then, the concept of a generic set of self-management skills that is applicable to all chronic conditions has gained considerable traction (Coventry, Fisher, Kenning, Bee, & Bower, 2014; Farrell, Wicks, & Martin, 2004; Gallagher, Donoghue, Chenoweth, & Stein-Parbury, 2008; Harvey et al., 2008), and is now a key concept that underpins the CCM framework.

Drawing on all of these sources, we suggest that any useful and comprehensive definition of chronic condition self-management must first acknowledge the client's capacity for self-determination, namely the ability to exercise a measure of control over his or her health. This ability extends beyond the skills needed to manage or adhere to a specific health intervention and reaches into the domains of physical, psychosocial, communicative, and behavioural functioning, regardless of the specific nature of the chronic condition. Self-

management should be considered a dynamic process, one that is exercised over the long-term or lifelong course of the chronic condition.

2.6 What is the role of the clinician in self-management support?

Traditionally, clinical support has been primarily informational in nature, with a focus on educating clients about their health condition and teaching them the skills they need to manage a condition-specific treatment or intervention (Bodenheimer, Lorig, et al., 2002). However, just as self-management is not simply managing and adhering to a particular treatment or rehabilitation strategy, self-management support is not restricted to the provision of information about the client's condition or impairment. In an outline of the components necessary for successful self-management, Lorig and Holman (2003) state that the "formulation of a client-clinician partnership" is a key aspect of self-management, echoing the "productive interactions" between clients and clinicians that underlie the CCM (Wagner et al., 2001). Battersby et al. (2010) further emphasise the critical role of social and professional support in successful self-management, stating that "optimal self-management… involves working collaboratively with health professionals… and is the product of a partnership between the client, the family, and health care providers."

According to Lawn and Schoo (2010), effective self-management support has three main components. The first of these, ongoing individualised assessment, involves evaluating the client's level of self-management skill as a basis for selecting individually appropriate self-management goals and interventions. Lawn and Schoo highlight the importance of conducting such assessments on a regular basis, not just at the time of diagnosis and the initiation of treatment, since client needs and capabilities can fluctuate over time. The second component is collaborative goal-setting. Clinicians should not dictate client activities; rather, clinicians and clients should work in partnership to develop individualised and realistic self-management goals. The third component is skill development, in which clinicians provide the support that will assist clients in achieving their stated self-management goals. Skill development spans a wide range of topics and includes teaching clients how to "solve problems, make decisions, set goals, access available resources, cope with the emotional challenges of the chronic condition, and monitor and evaluate their own progress" (Lawn & Schoo, 2010). Ultimately, self-management support necessitates the "fundamental transformation of the client-clinician relationship into a collaborative partnership" (Bodenheimer, Wagner, & Grumbach, 2002). The

conceptualisation of self-management support as a collaborative partnership underscores the fact that the goal of self-management support is not to ensure that all clients achieve a uniform standard of self-management that has been chosen by the clinician, but to assist the client in reaching his or her own self-defined goals and to move along a continuum toward optimal health and wellbeing (Koch, Jenkin, & Kralik, 2004; Kralik, Koch, Price, & Howard, 2004).

Self-management support may be provided opportunistically, by integrating it into routine clinical care through the use of empathic communication, tailored information, and motivational interviewing techniques (Battersby et al., 2010; Lawn & Schoo, 2010), or in a more structured format. In the next section we examine two evidence-based structured self-management support programs: one that focuses on assessment and goal-setting, and one that focuses on education and skill acquisition.

2.7 How can self-management support be implemented in clinical practice?

2.7.1 Flinders Chronic Condition Management Program™

The Flinders Chronic Condition Management Program™ is a self-management program that sits, both conceptually and practically, within the framework of the CCM and prioritises collaboration between clinicians and clients in the management of chronic conditions (Battersby, 2005). The program grew out of a coordinated care trial in which it was observed that service coordinators naturally provided coordinated care on the basis of clients' self-management skills, rather than the severity of their health condition (Battersby et al., 2007). Assessment of the client's self-management is undertaken with two complementary tools, the Partners in Health scale (Battersby, Ask, Reece, Markwick, & Collins, 2003; Petkov, Harvey, & Battersby, 2010; Smith, Harvey, Lawn, Harris, & Battersby, 2017) and the Cue and Response interview (Battersby et al., 2003). As shown in Table 2-1, the Partners in Health scale contains 12 statements, each of which probes a different facet of self-management. Clients complete the scale independently, rating each item on a scale from 0 (*very little/never/not very well*) to 8 (*a lot/always/very well*). The Partners in Health scale aims to obtain the client's view of his or her self-management skills without influence from the clinician. The Cue and Response interview, which focuses on the same 12 items as the Partners in Health scale, is completed collaboratively by the clinician and the client (Table 2-1). During the interview, the clinician uses open-ended cue

questions to elicit further information about each item. Based on the client's responses to the cue questions, the clinician provides a rating from 0 to 8; the ratings of the client and clinician are subsequently compared. At this point, the client has the opportunity to revise his or her rating if the discussion has triggered a shift in perception. For example, the client may realise, based on the clinician's feedback, that he or she manages more successfully than originally believed; conversely, the clinician's input may bring to light a previously unrecognised area of difficulty.

Table 2-1. The Partners in Health scale items and the Cue and Response interview questions from the Flinders Chronic Condition Management Program™

Partners in Health scale item	Cue and Response interview questions
1. Overall, what I know about my health condition is	1. What do you know about your condition (e.g. causes, effects, symptoms)? What could happen to you with this condition? What does your family/carer understand about your condition?
2. Overall, what I know about the treatment (including medications) of my health condition is	2. What can you tell me about your treatment? What may happen if the treatment is stopped? What other treatment options, including alternative therapies, do you know about? What does your family/carer understand about your treatment?
3. I take medications or carry out the treatments asked by my doctor or health worker	3. What stops you from taking medication as prescribed (e.g. lack of understanding, frequency, side effects, costs, other barriers)? What stops you from carrying out your other treatments (e.g. not knowing what to do and why, time, energy, other barriers)?
4. I share in decisions made about my health condition with my doctor or health worker	4. How involved do you feel in making decisions about your health with your doctor/care coordinator? Does your doctor/health worker listen to you? Is there anyone else who makes your health decisions for you?
5. I am able to deal with health professionals to get the services I need that fit with my culture, values, and beliefs	5. How do you get the services you need to manage your health? How do these services fit in with your culture, values, and beliefs? How confident are you dealing with health professionals to get these services? Is there anything that stops you from using these services?
6. I attend appointments as asked by my doctor or health worker	6. What prevents you from attending your appointments (e.g. transport problems, cost, physical disability)?

Partners in Health scale item	Cue and Response interview questions
7. I keep track of my symptoms and early warning signs (e.g. blood sugar levels, peak flow, weight, shortness of breath, pain, sleep problems, mood)	7. What are the early warning signs or symptoms that you need to check and write down for your condition? What is it important to check for early warning signs or symptoms? How often do you check and/or write down these signs and symptoms? What stops you from doing this?
8. I take action when my early warning signs and symptoms get worse	8. What do you do to manage your early warning signs and symptoms? What stops you from taking the recommended action? Do you have a written action plan? How is your family/carer involved?
9. I manage the effect of my health condition on my daily activities and physical activities (e.g. walking, hobbies, and household tasks)	9. What activities have become more difficult to do (e.g. showering, walking, household jobs, etc.)? What things can you no longer do? How much does your health condition interfere with you going out of your home? How do you manage these aspects?
10. I manage the effect of my health condition on how I feel (e.g. my emotions and my spiritual wellbeing)	10. Do you ever feel as though the effort of daily activities is too much for you (e.g. feeling tired, can't be bothered, etc.)? Does your condition ever get you down? How do you feel about your life at the moment? How does your illness affect your spiritual wellbeing?
11. I manage the effect of my health condition on my social life (e.g. my ability to participate, how I mix with other people, and my personal relationships)	11. Tell me about the people who support you. How does your condition affect the way you mix or socialise with other people? What aspects of your social life would you like to change? How does your condition impact on you ability to maintain w work/hobbies?
12. Overall, I manage to live a healthy lifestyle (e.g. no smoking, healthy food, moderate alcohol, regular physical activity, sleep well, manage stress and worry)	12. What do you do to help stay as healthy as possible? What things do you do that could make your health worse (e.g. smoking, alcohol, diet, inactivity, stress, drugs, gambling)? What aspects of your lifestyle would you like to change?

The Problems and Goals assessment and the Care Plan are used for goal-setting and management planning (Battersby, Ask, Reece, Markwick, & Collins, 2001). The Problem and Goals assessment distils the results of the Partners in Health scale and the Cue and Response interview into a single problem for the client to address. Clients are asked to identify what they see as their biggest problem, its impact on their life, and how the problem makes them feel. Problem severity is rated on a 0-8 scale; higher numbers indicate greater severity. Clients are next asked to nominate a medium- to long-term self-management goal that is specific, measurable, action-based, and realistic, which can be achieved over the subsequent 6-9 months. Progress toward goal achievement is rated on a 0-8 scale, with 0 representing no success and 8 representing complete success. The Care Plan begins with the client's chosen problem and goal and lists a number of short-term goals and interventions that will ultimately lead to the achievement of the primary, longer-term goal.

Together, the Flinders Chronic Condition Management Program™ tools yield an assessment of a client's self-management skill and aid the clinician in the development of individualised, realistic, and achievable goals for enhancing self-management skills and effecting behavioural change. Figure 2-2 provides an example of how the tools could be used in the context of adult hearing rehabilitation. A key strength of the program is that its use is not restricted to a particular chronic condition. Efficacy of the program has been demonstrated for a diverse range of health conditions, including Type 1 diabetes (Battersby et al., 2008), cardiovascular and respiratory diseases (Battersby, Harris, Smith, & Reed, 2015; Rowett, Simmons, Cafarella, & Frith, 2005), mental illness (Battersby et al., 2013; Lawn et al., 2007), and arthritis (Crotty et al., 2009). A further strength is the program's inclusion of an assessment component. Although a wide range of interventions to improve self-management exist, there are few tools available with which the clinician can assess the client's level of self-management skill. Additionally, the majority of the currently available self-management assessment tools – such as the Multiple Sclerosis Self-Management Scale (Bishop & Frain, 2011) and the Mental Health Self-Management Questionnaire (Coulombe et al., 2015) – are condition-specific and are thus restricted in their use to the designated client subgroup. One potential drawback is that use of the full suite of Flinders Chronic Condition Management Program™ tools is time-intensive. Assessment of a client with the Partners in Health scale and the Cue and Response interview can take up to half an hour, which could present a challenge to the time constraints imposed by routine clinical practice (Lawn & Schoo, 2010). Given its stated

focus on assessment and goal-setting, the Flinders Chronic Condition Management Program™ provides clinicians with the tools needed to support these processes, but not with the educational materials or interventions for improving self-management (Kubina & Kelly, 2007). Indeed, the training materials for the Flinders Chronic Condition Management Program™ explicitly identify situations where clients should be referred to a lay-led course (Battersby et al., 2001) like the Chronic Disease Self-Management Program (CDSMP; Lorig et al., 1999), which is discussed in the next section.

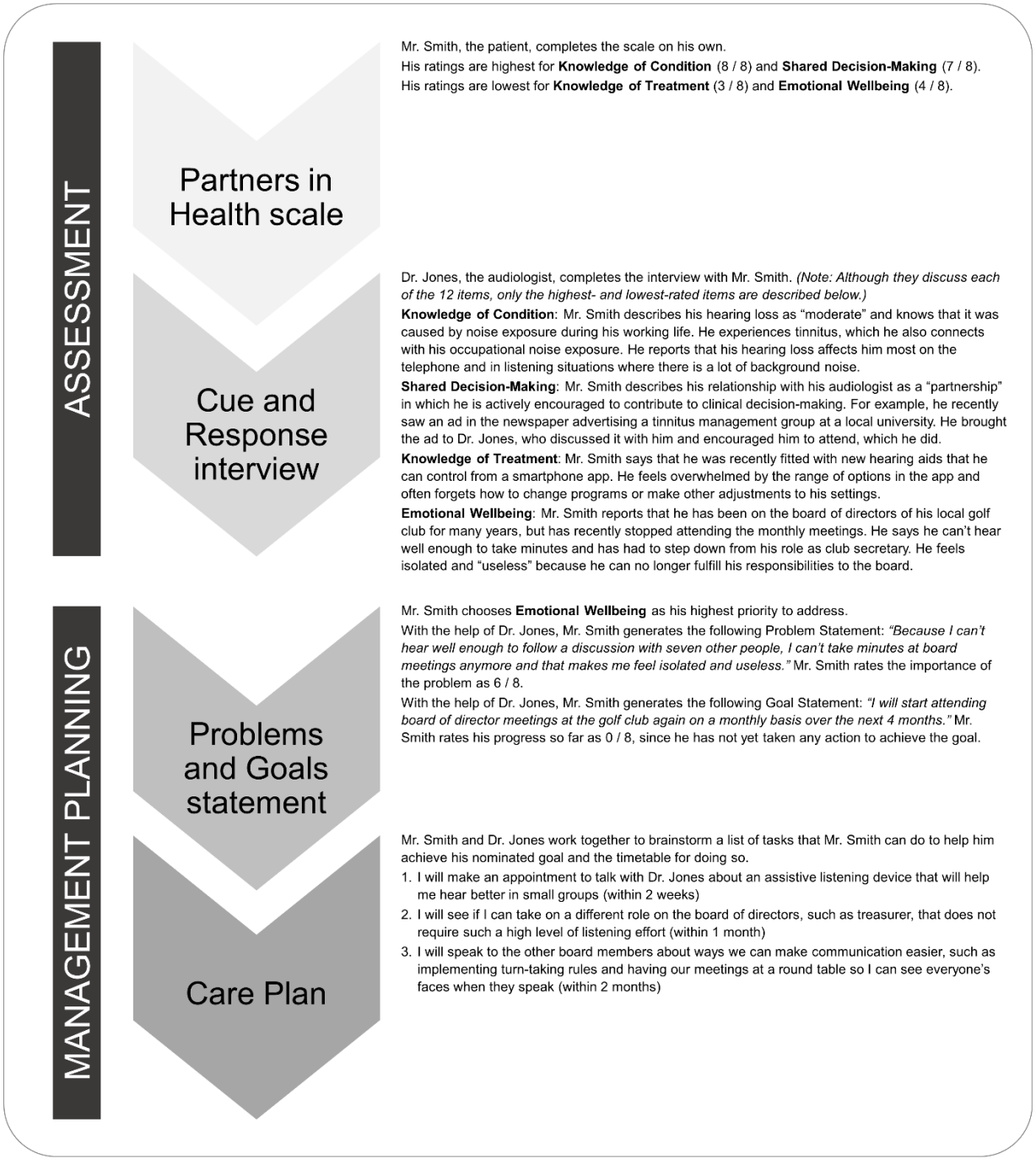

Figure 2-2. A case study illustrating how the Flinders Chronic Condition Management Program™ tools could be used in the context of adult hearing rehabilitation

2.7.2 Chronic Disease Self-Management Program

Unlike the Flinders Chronic Condition Management Program™, which focuses on individual self-management assessment and goal-setting, the CDSMP was initially designed as a group education program (Lorig & Holman, 2003). In its current form, the CDSMP is a lay-led, community-based self-management support program that aims to effect health behaviour change (Lorig, Mazonson, & Holman, 1993). The theoretical foundation of the CDSMP is Bandura's social cognitive theory, and is based on the idea that successful behaviour change requires both a belief in one's own ability to perform the behaviour (self-efficacy) and an expectation that enacting the behaviour will assist in achieving the desired goal (outcome expectancy) (Bandura, 1977, 2001, 2004). The CDSMP program targets self-efficacy for self-management behaviours, rather than the behaviours themselves (Lorig & Holman, 2003). The content and format of the CDSMP was informed by Clark et al.'s (1991) identification of the generic self-management tasks that are believed to be common to all chronic conditions. During the development of the CDSMP, these tasks were reviewed with a series of client groups in which adults with a range of chronic conditions were asked to describe their condition and their beliefs about its cause, reflect on the effects of their chronic condition on their lives and their feelings about them, and explain the problem-solving strategies they used to cope with these effects (Lorig et al., 1996).

The CDSMP is run as a weekly workshop of 12-16 clients that meets for six consecutive weeks for 2.5 hours per session and is facilitated by two trained leaders (Sobel, Lorig, & Hobbs, 2002). The topics covered in the weekly sessions include goal-setting, problem-solving, physical and emotional management techniques, medication use and adherence, communication skills, decision-making, and information-seeking. The content of each session is tailored to the individual group in that participants create weekly action plans, discuss experiences, and assist each other in troubleshooting the problems they encounter in performing self-management activities. Two key characteristics make the CDSMP unique among self-management interventions. First, in line with the idea that managing any chronic condition requires a common set of skills, groups are composed of participants with a range of different conditions. Second, at least one of the two group facilitators must be a layperson who also has a chronic condition. Use of peers as group facilitators is consistent with the role of modelling, or "vicarious experience," as an agent for improving self-efficacy within Bandura's social cognitive theory (Bandura, 2004). In

other words, when we observe another person succeeding at a task, particularly a person with whom we perceive we share common traits, our own self-efficacy for performing that task is thought to increase. Indeed, evidence has suggested that the peer-led nature of the CDSMP is the fundamental mechanism by which it serves to improve clients' self-efficacy for self-management, since the group facilitators not only impart knowledge and skills, but serve as positive role models (Lorig et al., 1999). The use of peer facilitators is also thought to be less confronting than receiving formal, one-on-one instruction from a health professional (Foster, Taylor, Eldridge, Ramsay, & Griffiths, 2007). On the other hand, it has been suggested that the structured group format of the CDSMP may make addressing individual needs a challenge and may invite negative social comparisons among group members (Lawn & Schoo, 2010).

2.8 What is the evidence that improving self-management leads to improved client outcomes?

Self-management support is a useful component of clinical practice to the extent that it is significantly associated with improved client outcomes. In this section, we consider the evidence for the CDSMP and the Flinders Chronic Condition Management Program™ in the context of Lawn and Schoo's (2010) statement that effective self-management support has three components: (1) ongoing individualised assessment; (2) collaborative goal-setting; and (3) skill development. Although it is considered best practice in chronic condition management to provide self-management support that includes all three components (Bodenheimer, Wagner, et al., 2002; Wagner et al., 2001), the vast majority of self-management research has examined the outcomes achieved with the CDSMP, which focuses solely on the third component. Two of the most recent systematic reviews of this research, conducted by Franek (2013) and Foster et al. (2007), found small, though statistically significant, improvements in self-reported pain and fatigue, participation in exercise, and self-efficacy for self-management activities as a result of participation in the CDSMP. Small but significant effects on HRQoL and self-reported general health were reported by Franek (2013), but not by Foster et al. (2007).

Franek (2013) hypothesised that the small effect sizes frequently seen in systematic reviews of the CDSMP evidence could arise, at least in part, from the variable baseline levels of participants' self-management skills, since they are not formally assessed prior to commencement of the program. A systematic review conducted by Newman et al. (2004)

suggests that this could be a particularly important factor in studies that use psychological outcome measures, such as health distress, depression, and anxiety, to evaluate the CDSMP. Those clients who show little to no improvement on these measures may not have had clinically significant psychological symptoms upon commencement of the program. As a result, Franek (2013) and Newman et al. (2004) suggested that two major priorities of future self-management research should be to develop ways of better identifying who could benefit most from self-management support and to determine how self-management interventions should be best tailored to the individual client. Studies that have used the Flinders Chronic Condition Management Program™ in conjunction with the CDSMP – thus adding the ongoing individualised assessment and collaborative goal-setting components to the skill development component of self-management support – suggest that this is a promising approach. In one study, Harvey et al. (2008) studied a group of 175 clients with a variety of chronic conditions, such as diabetes, arthritis, and chronic respiratory and cardiovascular disease, many of whom had multiple comorbidities. Self-management was assessed with the Partners in Health scale and Cue and Response interview at baseline and at 6, 12, and 18 months. At the time of the initial self-management assessment, clients underwent an individual determination of their self-management goals and subsequent self-management interventions were tailored accordingly. The data were analysed using random coefficient regression analysis, revealing significant and sustained improvements on 11 of the 12 items of the Partners in Health scale ($p < 0.0001$). Item 3, which probes adherence to treatment, was the only item that did not show significant improvement over time; scores on this item were already high at baseline for the majority of participants. Although only *p* values were reported for the health indicator data, they indicated significant improvements in self-reported general health, pain levels, level of frustration with their condition, fear about the future, and anxiety at the end of the 18-month study period ($ps < 0.05$).

A similar study, a randomised controlled trial undertaken with 77 Vietnam veterans with mental health conditions and a history of alcohol abuse, employed a similar protocol, using the Flinders Chronic Condition Management Program™ tools to assess self-management, collaboratively set goals, and provide tailored self-management support (Battersby et al., 2013). Self-management, as measured by the Partners in Health scale, was significantly improved by a mean of 12.1 points from baseline to 9 months ($p < 0.0001$) and 13.4 points from baseline to 18 months ($p < 0.0001$). Participants in the intervention group demonstrated significantly greater improvements on the primary outcome measure, a self-

report questionnaire about risky alcohol use, relative to the control group (p = 0.039). Fifty-one percent of participants reported that they considered the problems identified at the initial assessment on the Problems and Goals assessment to be solved at 9 months, and 65% deemed their goals to be achieved at 9 months post-intervention. Both studies highlight the value of assessing a client's self-management on a continuous basis and providing self-management interventions that are individually tailored to their needs and preferences (Battersby et al., 2013; Harvey et al., 2008). The efficacy of such an approach to self-management support is further supported by a recent systematic review that aimed to identify the specific attributes of successful self-management interventions. The review concluded that despite varying levels of effectiveness of different self-management interventions for different chronic conditions and different client groups, the most successful interventions are: (1) multifaceted, including education about the condition and its treatment, strategies for managing psychosocial wellbeing, and social support; (2) tailored to the individual client's needs, preferences, capabilities, beliefs, and health status; and (3) offered in the context of a collaborative client-clinician relationship which is, in turn, embedded in an organisational culture that actively promotes and supports client self-management (Taylor et al., 2014).

2.9 To what extent has self-management support been adopted in hearing health care for adults?

Elements of self-management support have long been components of aural rehabilitation and communication programs. Such programs vary in content, but typically include information about hearing loss and hearing aid use, communication strategies, speechreading tactics, relaxation and mindfulness techniques, and/or psychosocial support. A facilitated group setting has traditionally been considered the most cost-effective method of delivering aural rehabilitation, with the added benefit of enabling peer support and the exchange of ideas between group participants (Hawkins, 2005; Preminger & Yoo, 2010). For example, the Active Communication Education (ACE) program is a five-week facilitated group program in which participants learn problem-solving skills for use in challenging communicative situations (Hickson et al., 2007b). Advances in technology have informed the delivery modes of more recently developed aural rehabilitation programs. An example is C2Hear, a library of interactive videos that address practical aspects of hearing aid management, adapting to amplification, and communication strategies (Ferguson, Brandreth, Brassington, Leighton, & Wharrad, 2016). Similarly,

Thorén et al. (2014) have reported on an online rehabilitation program that incorporates ACE; self-paced learning; sessions with professionals to learn more about hearing loss, hearing aids, and communication strategies; and chat rooms in which participants can communicate with peers. A randomised controlled trial on 74 adult hearing aid users showed that participation in the online program resulted in significant improvements in self-reported communication skills relative to a control group that received only the self-paced learning component of the program (Malmberg, Lunner, Kähäri, & Andersson, 2017). Notably, both the intervention and control groups reported significantly reduced hearing handicap relative to their pre-trial scores, suggesting that even participating in short or limited rehabilitation interventions can yield some benefit.

In keeping with the evidence base supporting the use of specific self-management interventions for other chronic conditions, aural rehabilitation programs have been shown in individual studies to improve psychosocial wellbeing (Hickson, Worrall, & Scarinci, 2007a; Thorén et al., 2014), reduce activity limitations and participation restrictions (Hickson et al., 2007b; Preminger & Yoo, 2010), foster greater knowledge of hearing loss and hearing aids (Ferguson et al., 2016), and improve quality of life (Kramer et al., 2005). However, systematic reviews of aural rehabilitation outcomes consistently conclude that the evidence base is weak (Chisolm & Arnold, 2012; Hawkins, 2005; Michaud & Duchesne, 2017). Two systematic reviews evaluated counselling-based programs offered in a facilitated group format. Both reviews concluded that while aural rehabilitation programs resulted in a reliable, statistically significant, short-term reduction in perceived degree of hearing handicap, the effect size was small (Chisolm & Arnold, 2012; Hawkins, 2005). The results of a more recent systematic review, which restricted the focus to randomised controlled trials that employed HRQoL as an outcome measure, were inconclusive, with the authors stating that there was insufficient evidence at present to make a definitive statement regarding the effect of aural rehabilitation programs on HRQoL for adults with hearing loss (Michaud & Duchesne, 2017). The authors of all three systematic reviews have suggested that the small effect sizes typically seen in aural rehabilitation research may be due to several factors. First, there is considerable heterogeneity in the goals, duration, and content of the aural rehabilitation programs that are evaluated from one study to the next. Second, the majority of aural rehabilitation programs have standard curricula and are offered over a fixed time period, thus operating on the implicit assumption that all clients stand to benefit from the intervention. However, large improvements may be evident only among clients who start off with significant

deficiencies in the areas targeted by the program, whereas clients who begin an aural rehabilitation program with relatively good skills may show small to negligible gains upon completion of the program simply because they have less room to improve (Abrams & Chisolm, 2013; Chisolm & Arnold, 2012). Third, the outcome measures that are typically employed in hearing rehabilitation research, particularly those that assess HRQoL, are thought to lack sufficient sensitivity to demonstrate larger effect sizes (Chisolm & Arnold, 2012; Hawkins, 2005; Michaud & Duchesne, 2017).

Only one series of studies is known to have evaluated the real-world availability of self-management interventions in HHC from the theoretical perspective of the CCM (Wagner et al., 2001). Barker, Munro, and de Lusignan (2015) conducted a Delphi review to determine the extent to which HHC professionals were in agreement regarding self-management support strategies and the identification of clients who were successful self-managers. A Delphi review is an anonymous, iterative process for seeking expert consensus on a topic or issue of interest. Participants in a Delphi review provide input to the topic, generally via questionnaire, in successive rounds. Responses from each round are fed back to the group so that individual participants can reassess their input in light of the emerging convergence of opinion on the topic (Hasson, Keeney, & McKenna, 2000). While there was a general consensus in Barker et al.'s (2015) study that HHC professionals should play an integral role in providing self-management support, a related study identified that self-management support is not a widespread feature of routine clinical practice. A content analysis of British policy documents outlining standards of care for hearing loss and for a group of designated chronic conditions was undertaken, with the aim of determining how well they conformed to the CCM (Barker, de Lusignan, Baguley, & Gagné, 2014). While neither standard fully exemplified the CCM, the audiological policies mapped especially poorly onto the model's framework, with particular deficiencies observed in the self-management support component. Reflecting on the outcome of the Delphi review, Barker et al. (2015) speculated that a possible contributor to the gap between belief and practice could be traced to the fact that the clinical behaviours that were identified as necessary to provide effective self-management support were broad and vaguely defined, such as "be professional" and "promote self-advocacy." They suggested that defining these attributes in more concrete, behavioural terms could facilitate uptake and enactment of these behaviours in routine clinical practice.

2.10 Conclusions and future research directions

HHC is biomedically focused, device-centred, and clinician-led. Adoption of a model of service delivery that is designed for chronic conditions, such as the CCM, could be a feasible way of moving toward a more biopsychosocial, client-centred style of clinical practice and an improvement in client outcomes (Coleman et al., 2009; Wagner et al., 2001). Self-management support is a critical component of the CCM that places the client at the centre of care and transforms the clinician-client relationship into an active, equal partnership (Bodenheimer, Wagner, et al., 2002; Lawn & Schoo, 2010; Lorig & Holman, 2003). Elements of self-management support have made inroads into HHC, primarily via aural rehabilitation and communication programs, yet there are still significant gaps in our knowledge, evidence base, and clinical practice.

Future research into chronic condition self-management in the context of HHC should ideally address the three key components of effective self-management support defined by Lawn and Schoo (2010): (1) ongoing individualised assessment; (2) collaborative goal-setting; and (3) skill development. Clinical tools should be modelled on the complementary strengths of the Flinders Chronic Condition Management Program™ and the CDSMP. First, a method for assessing self-management in adults with hearing loss should be developed. The results of administering such an assessment would enable clinicians to identify the client's areas of strength and weakness such that subsequent interventions could be tailored to individual needs, preferences, and capabilities. The availability of a self-management assessment tool for hearing loss could further enable research into the factors that influence a client's ability to successfully self-manage a hearing loss and the relationship between self-management and hearing rehabilitation outcomes. Second, interventions to improve the self-management skills of adults with hearing loss should be developed and evaluated. Existing aural rehabilitation programs tend to focus on improving communicative function and/or increasing hearing aid use, which are important goals, but there is a paucity of interventions that provide psychosocial support and enable the development of skills to manage the social and emotional effects of hearing loss on everyday life.

Future self-management research should have as its ultimate goal implementation of the findings into clinical practice. Hearing health researchers have traditionally aimed to influence clinical practice by disseminating research findings through such channels as

peer-reviewed literature and conference presentations. Boisvert et al. (2017) conducted a study that aimed to determine how audiologists rated the importance and reliability of the different sources of information they use to inform their clinical practices, particularly those related to decision-making and discussing rehabilitation options with clients. Of particular relevance to the process of knowledge translation was their finding that peer-reviewed literature and conference presentations were ranked as neither important nor reliable by the clinicians who participated in the study. To better address these factors, the authors proposed that audiology adopt an "integrated model of knowledge translation," which they define as an active collaboration between creators and consumers of research in which clinicians are integrated into all stages of the research, from conception to dissemination (Boisvert et al., 2017). In order to achieve successful translation of research findings into clinical practice, future chronic condition self-management work could draw on behaviour change methodology such as the Behaviour Change Wheel (Michie, van Stralen, & West, 2011). In the context of incorporating self-management support into clinical practice, the Behaviour Change Wheel could provide a theoretical framework for defining the specific behaviours that that could lead to improved self-management support, selecting the behaviour(s) that are likely to be amenable to intervention, and identifying appropriate intervention functions that could be used to bring about the desired behaviour(s). Ultimately, research into chronic condition self-management in the context of HHC should aim to support clinicians in providing client-centred care and to empower clients in becoming active participants in the self-management of their own hearing, health, and wellbeing.

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Chapter 3. Assessing hearing loss self-management in older adults

This chapter is the first of three to evaluate the use of a validated, generic pair of self-management assessment tools in a sample of older adults with hearing loss. The Partners in Health scale and the Cue and Response interview from the Flinders Chronic Condition Management Program™ were modified for audiology use with permission from the original developers (Appendix A). The first step in the modification process was to revise the language of each scale item to reflect audiological terminology, e.g. changing “medication” to “rehabilitation” and “doctor” to “hearing health professional.” The cue questions in the interview were similarly modified. The second step was to pilot the revised tools with a group of seven older adults with hearing loss to ensure the items and questions were appropriately understood and to invite feedback on how the tools should be further modified. Appendix B shows the final versions of the modified Partners in Health scale and Cue and Response interview that were used when collecting data for this and subsequent chapters.

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3.1 Abstract

Objective: To evaluate the capacity of a self-management assessment tool to identify unmet hearing health care needs; to determine whether such an assessment yields novel and clinically useful information.

Design: Hearing loss self-management was assessed with the Partners in Health scale and the Cue and Response interview from the Flinders Chronic Condition Management Program™. The results of the scale and the interview were compared to determine the extent to which they each contributed to the assessment of hearing loss self-management.

Study Sample: Thirty older adults who currently receive hearing health care.

Results: The two assessment tools were useful in identifying the specific domains in which participants lacked good hearing loss self-management skills. While participants tended to have a high level of knowledge about hearing loss and technology-based interventions, many reported the presence of unmet psychosocial needs with no clear plan for addressing them. There was considerable variation in terms of the extent to which their audiologists facilitated shared decision-making.

Conclusions: The results suggest that hearing loss self-management has the potential to play an important role in audiological rehabilitation. A hearing loss self-management assessment tool that more precisely matches the unique needs of people with hearing loss should be developed, along with interventions to meet those needs.

3.2 Introduction

The effects of hearing loss extend beyond the physiology of the auditory system and reach into the domains of communicative, behavioural, cognitive, and psychosocial functioning (Bainbridge & Wallhagen, 2014; Kramer, Kapteyn, Kuik, & Deeg, 2002). Consequently, living well with a hearing loss does not depend exclusively on the use of devices, such as hearing aids or cochlear implants, to compensate for peripheral auditory dysfunction. Rather, it is contingent upon the acquisition, mastery, and application of an array of skills to manage the multidimensional impact of hearing loss on everyday life, an active and ongoing process known as self-management (National Health Priority Action Council, 2006).

With its biomedical approach and strong reliance on technology-based interventions, the hearing health care (HHC) system tends to treat hearing loss as if it were an acute health condition. However, permanent hearing loss is a chronic condition that requires long-term, ongoing management. Self-management is a key driver of successful health outcomes for chronic conditions and a fundamental component of the Chronic Care Model (CCM), an established organisational framework that describes best-practice clinical care for chronic conditions at the client, clinician, health system, and community levels (Bodenheimer, Wagner, & Grumbach, 2002; Wagner et al., 2001). The implementation of programs that foster self-management skills yields significant benefits for clients and clinicians alike,

including better quality of life, greater independence, increased likelihood of adhering to and succeeding with treatment, fewer unplanned interactions with the health care system, lower health care expenditure, and more efficient allocation of clinical resources (Lorig et al., 2001; Norris, Engelgau, & Narayan, 2001).

In an audiological context, hearing loss self-management (HLSM) strategies are taught as part of the Active Communication Education (ACE) program (Hickson, Worrall, & Scarinci, 2007a), C2Hear (Ferguson, Brandreth, Brassington, Leighton, & Wharrad, 2016), and a number of other auditory rehabilitation programs (Kramer, Allessie, Dondorp, Zekveld, & Kapteyn, 2005; Preminger & Rothpletz, 2016; Thorén, Öberg, Wänström, Andersson, & Lunner, 2014). These strategies include communicative problem-solving skills (Ferguson et al., 2016; Hickson et al., 2007a; Preminger & Yoo, 2010) and 'psychosocial exercises' in which individuals are invited to talk about their thoughts and feelings about hearing loss and its impact on personal relationships (Preminger & Yoo, 2010; Preminger & Ziegler, 2008). In keeping with the evidence base supporting the use of self-management interventions for other chronic conditions, these programs have been shown to improve psychosocial wellbeing (Hickson, Worrall, & Scarinci, 2007b; Thorén et al., 2014), reduce activity limitations and participation restrictions (Hickson et al., 2007b; Preminger & Yoo, 2010), foster greater knowledge of hearing loss and hearing aids (Ferguson et al., 2016), and improve quality of life (Kramer et al., 2005), suggesting that HLSM has an important role to play in audiology. However, since the explicit purpose of such rehabilitation programs is to improve communicative function, the HLSM component is typically limited to activities that directly relate to achieving this goal. Currently, there are no known interventions in audiology designed to address the full spectrum of HLSM skills, which would additionally include coming to terms with and accepting the hearing loss; understanding the causes, characteristics, and effects of hearing loss; monitoring for the development of new problems and responding appropriately; working collaboratively with HHC professionals; and managing the effects of the hearing loss on psychosocial wellbeing (Clark et al., 1991).

With the exception of ACE (Hickson et al., 2007a) and C2Hear (Ferguson et al., 2016), auditory rehabilitation programs and associated interventions to improve HLSM have made few inroads into routine clinical care in audiology. Barker, de Lusignan, Baguley, & Gagné (2014) undertook a content analysis of British policy documents outlining standards of care for hearing loss and for a group of designated chronic conditions, with the aim of

determining how well they conformed to the CCM (Wagner et al., 2001). While neither standard fully exemplified the CCM, the audiological policies mapped especially poorly onto the model's framework, with particular deficiencies observed in the self-management support component. The successful transition of HLSM interventions from a research environment to clinical practice may be hindered by the perception that HLSM is too complex to address within the space of a typical appointment and the lack of available resources to guide clinicians in prioritising areas of need. It is therefore possible that a clinical tool for assessing HLSM across a range of domains could assist the clinician in identifying unmet needs and tailoring subsequent HLSM interventions to the capabilities, resources, and preferences of the individual client.

A small number of self-management assessment tools are in current use for other chronic conditions. The majority are condition-specific and thus cannot be directly applied to other chronic conditions. Of the available generic measures, the most widely used is the assessment component of the Flinders Chronic Condition Management Program™ (Battersby, Ask, Reece, Markwick, & Collins, 2003). The Flinders Chronic Condition Management Program™ is a semi-structured assessment, planning, and motivational process that yields an assessment of a client's self-management skill and aids the clinician in the development of individualised, realistic, and achievable goals for enhancing self-management skills and effecting behavioural change. The program's complementary assessment tools, the Partners in Health scale and the Cue and Response interview, were developed in response to the observation that service coordinators taking part in a coordinated care trial instinctively provided care on the basis of clients' ability to self-manage, rather than the severity of their health condition (Battersby et al., 2007). The efficacy of the Partners in Health scale and the Cue and Response interview has been demonstrated for a diverse range of health conditions, including arthritis, cardiovascular and respiratory diseases, and Type 1 diabetes (Battersby, Harris, Smith, & Reed, 2015). The Partners in Health scale and the Cue and Response interview have been modified for use with adults with hearing loss and were reported in a pilot study of seven participants to be well-received (Convery, Keidser, Hickson, & Meyer, 2016). However, the clinical utility of the tools has not been systematically evaluated in a larger sample of people with hearing loss. The aim of the current study was therefore to investigate whether the Partners in Health scale and the Cue and Response interview can be used to assess HLSM in a sample of older adults who are current recipients of HHC.

3.3 Method

3.3.1 Participants

A power analysis conducted for a two-tailed dependent samples t-test indicated a target N of 34 to detect a medium effect size (Cohen's *d* = 0.5) with 80% power at an alpha level of 0.05. Since the participants in this study were a subset of a larger group who took part in a hearing aid field trial, there were a number of practical barriers (e.g. the number of study hearing aids available, the time frame in which the field trial took place) that prevented recruitment of 34 participants. A final sample size of 30 participants was recruited, which was sufficient to detect an effect size of *d* = 0.5 with 75% power or an effect size of *d* = 0.6 with 80% power at an alpha level of 0.05.

The inclusion criteria were: (1) bilateral hearing thresholds within the fitting range of the hearing aid; (2) between 50 and 85 years of age; and (3) current user of bilateral hearing aids with ≥1 year of hearing aid experience. The exclusion criteria were: (1) presence of active ear disease; (2) non-English speaking; and (3) additional disabilities that would preclude participation in a research study. Participants ranged in age from 51 to 85 years (median = 73 years). Ten participants were female and 20 were male. All had been clients of the Australian HHC system for 1.5 to 37 years (median = 7.5 years). Sixteen participants were eligible for public hearing services, while the remaining 14 received hearing services privately.

3.3.2 Materials

3.3.2.1 Partners in Health scale

The original Partners in Health scale (Table 3-1) is a 12-item questionnaire that assesses the respondent's self-management capability in the domains of knowledge, partnership in treatment, recognition and management of symptoms, and coping (Battersby et al., 2003; Smith, Harvey, Lawn, Harris, & Battersby, 2017). The four-factor structure of the scale has been confirmed with Bayesian confirmatory factor analysis (Smith et al., 2017). Respondents complete the scale independently and provide a rating for each item on a scale of 0 to 8, with higher scores reflecting better self-management skills. The aim of the Partners in Health scale is to obtain the client's perspective on his/her self-management

capability without influence from the clinician. The scale takes approximately 5-10 minutes to complete.

While the Partners in Health scale was developed as a generic tool that could ostensibly be used with any chronic condition, it employs more medical vocabulary (e.g. *doctor*, *medication*, *symptoms*) than is typically used in an audiological context. The wording of each item was therefore revised, and one item ultimately removed, as the result of an iterative consultation process with seven adults with hearing loss (Convery et al., 2016), a task that was undertaken with written permission from the developers of the Flinders Chronic Condition Management Program™ (S. Lawn, personal communication). Table 3-1 shows the modified 11-item Partners in Health scale that was used in the current study, alongside the original items.

Table 3-1. The original version of the Partners in Health scale items and the version that was modified for audiological use.

Factor	Topic	Original version	Modified version
Knowledge	Knowledge of Hearing Loss	1. Overall, what I know about my health condition is	1. Overall, what I know about my hearing loss is
	Knowledge of Treatment	2. Overall, what I know about the treatment (including medications) of my health condition is	2. Overall, what I know about the management of my hearing loss is
Partnership in Treatment	Adherence	3. I take medications or carry out the treatments asked by my doctor or health worker	3. I manage my hearing loss as asked by my hearing health professional
	Shared Decision-Making	4. I share in decisions made about my health condition with my doctor or health worker	4. I share in decisions made about my hearing loss with my hearing health professional
	Accessing Services	5. I am able to deal with health professionals to get the services I need that fit with my culture, values, and beliefs	5. I am able to deal with hearing health professionals to get the services I need that fit with my culture, values, and beliefs
	Attending Appointments	6. I attend appointments as asked by my doctor or health worker	6. I attend appointments as asked by my hearing health professional

Factor	Topic	Original version	Modified version
Recognition and Management of Symptoms	Monitoring for Changes	7. I keep track of my symptoms and early warning signs (e.g. blood sugar levels, peak flow, weight, shortness of breath, pain, sleep problems, mood)	7. I keep track of any changes in my health condition (e.g. sudden or gradual drop in hearing, pain or infection in my ears, hearing aids stopped working, problems handling or inserting my hearing aids)
	Taking Action	8. I take action when my early warning signs and symptoms get worse	8. I take action when I notice these changes
Coping	Physical Activity	9. I manage the effect of my health condition on my daily activities and physical activities (e.g. walking, hobbies, and household tasks)	*Item removed*
	Emotional Wellbeing	10. I manage the effect of my health condition on how I feel (e.g. my emotions and my spiritual wellbeing)	9. I manage the effect of my hearing loss on how I feel (e.g. my emotions and my spiritual wellbeing)
	Social Life	11. I manage the effect of my health condition on my social life (e.g. my ability to participate, how I mix with other people, and my personal relationships)	10. I manage the effect of my hearing loss on my social life (e.g. my ability to participate, how I mix with other people, and my personal relationships)
	Healthy Lifestyle	12. Overall, I manage to live a healthy lifestyle (e.g. no smoking, healthy food, moderate alcohol, regular physical activity, sleep well, manage stress and worry)	11. Overall, I manage to live a healthy lifestyle (e.g. no smoking, healthy food, moderate alcohol, regular physical activity, sleep well, manage stress and worry)

3.3.2.2 Cue and Response interview

The Cue and Response interview is completed collaboratively by the clinician and the client. The interview focuses on the same items from the Partners in Health scale, but uses cue questions to explore the client's understanding and knowledge of the item and to identify barriers and facilitators to good self-management. For example, the cue questions associated with item 10, *I manage the effect of my hearing loss on my social life (e.g. my ability to participate, how I mix with other people, and my personal relationships)*, include *How does your hearing loss affect the way you socialise with other people? Tell me about the people who support you. What aspects of your social life would you like to change?* The clinician records answers in the client's own words, paying particular attention to what the client knows, what the client does, and behaviours and beliefs that indicate readiness to change. Since the goal of the Cue and Response interview is to obtain information about the client's capacity for self-management, the focus of the interview is restricted to assessment, not the recommendation of problem-solving strategies. Motivational interviewing techniques are used during the interview process, which include asking open-ended questions, affirming the client's strengths to build rapport, listening reflectively to demonstrate understanding and express empathy, and summarising the key points made by the client (Battersby et al., 2010).

At the end of the discussion of each item, the clinician provides a rating on the same scale of 0 to 8 that was used in the Partners in Health scale. Client and clinician perspectives are then compared. When there is a discrepancy between clinician and client ratings of 3 or more, this signals an area for further discussion and provides an opportunity for the score to be adjusted. In the end, a single score is agreed upon for each item that reflects the perspectives of both the client and clinician. Scores of 5 and above indicate that the client is self-managing well in that area; scores of 4 and below indicate that a targeted intervention is needed in that self-management domain. The Cue and Response interview takes approximately 15-20 minutes to administer, although this can vary due to the individualised nature of the procedure.

In routine clinical practice, only the agreed-upon score yielded by the Cue and Response interview, which reflects both client and clinician perspectives, is typically considered in subsequent rehabilitation planning. For the purposes of the current study, however, the

Partners in Health scale score was also examined in isolation to determine the relative contributions of each component of the HLSM assessment.

3.3.3 Procedure

Participants attended the laboratory for a single appointment during which they underwent pure-tone audiometric testing and an assessment of HLSM, as measured by the Partners in Health scale and the Cue and Response interview. Years of hearing aid experience, gender, age, and the system through which the participant received HHC services (public or private) were elicited with a questionnaire.

Participants were compensated for their travel expenses. The treatment of participants was approved by the Australian Hearing Human Research Ethics Committee and the University of Queensland Medical Research Ethics Committee and conformed in all respects to the Australian government's National Statement on Ethical Conduct in Human Research (National Health and Medical Research Council, 2007).

Authorised use of the Flinders Chronic Condition Management Program™ tools is contingent upon completion of a two-day workshop run by an accredited trainer. The first author (EC) undertook this training in November 2014.

3.3.4 Data analysis

Correlation analysis (Pearson's product-moment or point-biserial, as appropriate to the type of variable) was performed to determine whether the participants' demographic characteristics were correlated with the Partners in Health scale and the Cue and Response interview scores. Dependent samples t-tests were used to determine whether there were significant differences between the Partners in Health scale and the Cue and Response interview scores. For both the correlation analysis and the dependent samples t-tests, a Bonferroni correction was applied to correct for multiple comparisons, yielding an alpha level of 0.004.

The responses to the Cue and Response interview were analysed using content analysis, a qualitative method for extracting meaning from textual data. A directed approach was used, in which the text is examined for the presence of concepts or ideas ("themes") that

have been pre-selected from existing theory or literature (Hsieh & Shannon, 2005). Three themes were chosen based on findings that current clinical practice in audiology is biomedically focused, device-centred, and clinician-led (Ekberg, Grenness, & Hickson, 2014; Grenness, Hickson, Laplante-Lévesque, Meyer, & Davidson, 2015; Pryce, Hall, Laplante-Lévesque, & Clark, 2016): (1) clinician minimisation of the psychosocial impact of hearing loss; (2) lack of client knowledge of non-technological interventions for hearing loss; and (3) clinician-led versus shared decision-making. Since participant responses to each item on the Cue and Response interview were relatively short, they were written down verbatim at the time of the interview. Responses were examined for their relevance to audiological practice and then grouped according to theme.

3.4 Results

As shown in Table 3-2, the mean total Partners in Health scale score was 71.0 out of a maximum possible score of 88, with a standard deviation of 8.68. Across the participant group, total scores ranged from 47 to 88. There was no significant correlation between the Partners in Health scale score and age (r = -0.21, p = 0.27), gender (r_{pb} = 0.34, p = 0.07), four-frequency average (4FA; average of pure-tone thresholds at 0.5, 1, 2, and 4 kHz) across both ears (r = 0.22, p = 0.24), years of hearing aid experience (r = 0.24, p = 0.19), or whether the participant received HHC services through the private or public system (r_{pb} = -0.01, p = 0.97).

Table 3-2. The mean, standard deviation, and range of the scores attained by the participants (N = 30) on each item of the Partners in Health scale and the Cue and Response interview

Item	Partners in Health scale			Cue and Response interview				
	Mean	Standard deviation	Range	Mean	Standard deviation	Range	t value	p value
Knowledge of Hearing Loss	5.8	1.26	3-8	6.1	1.52	3-8	-1.03	ns
Knowledge of Treatment	5.9	1.36	3-8	6.0	1.25	4-8	-0.13	ns
Adherence	6.5	1.17	3-8	6.4	1.16	4-8	0.57	ns
Shared Decision-Making	6.0	2.13	1-8	6.2	1.99	1-8	-1.41	ns
Accessing Services	6.9	1.49	2-8	7.1	1.14	4-8	-1.42	ns
Attending Appointments	7.6	0.82	5-8	7.6	0.82	5-8	NA[1]	NA[1]
Monitoring for Changes	7.0	1.35	2-8	6.3	1.48	4-8	2.66	ns
Taking Action	6.4	1.59	3-8	6.4	1.65	3-8	-0.27	ns
Emotional Wellbeing	6.4	1.38	3-8	5.5	1.55	2-8	3.37	0.002
Social Life	6.0	1.51	3-8	4.8	1.99	2-8	4.09	<0.0001
Healthy Lifestyle	6.5	1.23	3-8	6.3	1.27	3-8	1.10	ns
Total Score	71.0	8.68	-	68.7	7.69	-	2.41	ns

Note: Significant p values indicate items for which there was a significant change from the score on the Partners in Health scale to the score on the Cue and Response interview.

[1]A t-test could not be carried out on the Attending Appointments item because the initial and final scores were identical for all participants.

The mean total Cue and Response interview score was 68.7 out of a maximum possible score of 88, with a standard deviation of 7.69. Across the participant group, total scores ranged from 52 to 82. There was no significant correlation between the Cue and Response interview score and age (r = -0.39, p = 0.035), gender (r_{pb} = 0.26, p = 0.16), 4FA across both ears (r = 0.22, p = 0.25), years of hearing aid experience (r = 0.24, p = 0.21), or whether the participant received HHC services through the private or public system (r_{pb} = -0.02, p = 0.94). A t-test for dependent samples revealed that the Cue and Response interview score was significantly lower than the Partners in Health scale score on the Emotional Wellbeing (t = 3.37, p = 0.002) and Social Life (t = 4.09, p < 0.0001) items.

According to the Cue and Response interview scores on the individual items, the participant group demonstrated the best HLSM for Attending Appointments ($\bar{x}$ = 7.6) and Accessing Services ($\bar{x}$ = 7.1) and the poorest HLSM in the domains of Social Life ($\bar{x}$ = 4.8) and Emotional Wellbeing ($\bar{x}$ = 5.5). Within each item, the number of participants for whom an intervention to improve HLSM would be indicated (i.e. a score of 0-4) ranged from 0 (Attending Appointments) to 13 (Social Life).

3.4.1 Clinician minimisation of the psychosocial impact of hearing loss

When completing the Partners in Health scale, many participants indicated that they were able to manage the effect of their hearing loss on their emotional wellbeing *fairly well* (score of 5/8) to *very well* (score of 8/8). During the Cue and Response interview, however, the same participants would often describe their experiences of particular situations using negative emotional descriptors (Participant 27: *'Angry, sad, upset, anxious, frustrated… all of the above, really. It's momentary, not prolonged, but those feelings are there, and they do affect you'*; Participant 30: *'You get anxious about going to new places. I already have trouble seeing, and with the hearing on top of that… you start to worry about whether or not you'll be able to cope'*). When their attention was drawn to the fact that these words represented emotional states, and were encouraged by the experimenter to delve more deeply into these experiences, participants would often realise that their hearing loss had more of an impact on their emotional wellbeing than they had previously thought. Participant 20 further noted that he had not recognised the cumulative impact of what he had, up until now, considered to be isolated incidents:

> *'Well, when you list it out like that… I get frustrated with my daughter-in-law for trailing off at the end of sentences, I get frustrated when my wife's rummaging in the cutlery drawer and trying to talk to me when she should know better… yeah, it does build up into this general sense of frustration that you don't know how to deal with, because it's coming at you from all sides.'*

Participant 21 had never considered that a discussion of the emotional impact of her hearing loss was within an audiologist's scope of practice, saying, *'I've never had a conversation like this with my audiologist… she's never given the impression that this was the kind of thing she'd be interested in talking about.'* The same participant also believed that it would seem *'out of place'* to raise emotional concerns when her audiologist was *'concentrating on the computer, you know, when she's focusing on getting my hearing aids adjusted right.'*

In contrast, when responding to the Knowledge of Hearing Loss item, the majority of participants described the characteristics of their hearing loss in terms of its biomedical characteristics rather than its psychosocial effects. Participants typically referred to the frequency range in which their hearing loss was greatest (Participant 18: *'[My hearing loss] has a noticeable effect in the upper frequencies'*). Many participants were additionally able to identify the cause of their hearing loss (Participant 7: *'It's caused by otosclerosis… the nerve loss is a response to that. It improved somewhat after a stapedectomy'*).

3.4.2 Lack of client knowledge of non-technological interventions

Participants' responses to the Knowledge of Treatment and Adherence items during the Cue and Response interview were almost exclusively couched in terms of their knowledge and use of hearing aids. Participants demonstrated a sophisticated level of knowledge of hearing aid functions (Participant 30: *'When I press the button on this side, it activates the directional microphones, which are for noisy situations'*), and, as a group, tended to be consistent full-time users of their hearing aids. Relatively fewer participants were aware of other forms of assistive technology (Participant 21: *'My streamer's changed my life. I can hear on the phone, receive messages, watch TV, and listen to music. It all comes through my hearing aids'*). Those who did mention these interventions tended to be those who had acquired their hearing loss at a younger age or those who had worn hearing aids the longest. Participant 3, whose entry into the HHC system was prompted by tinnitus, rather than hearing loss, was the only participant who mentioned hearing protection (*'I make sure*

I use hearing protection when I'm mowing the lawn and that sort of thing. If I don't my tinnitus gets worse and I know I could eventually lose more hearing').

Similarly, in response to the Monitoring Changes item, most participants identified a hearing aid issue as an event that would trigger a visit to their audiologist (Participant 10: *'The [hearing aid] settings weren't quite right, so I had them reprogrammed. Then they started using up more batteries, and they fixed that, too'*; Participant 15: *'I make sure I change the wax guards and the battery if I find I can't hear all of a sudden'*). Fewer participants nominated a decline in hearing as an event to watch for; the participants who did so tended to be those who had experienced such an event in the past or whose hearing thresholds were prone to fluctuating (Participant 7: *'My ENT said that with otosclerosis it can get worse, so I know I need to be vigilant about getting a test whenever it starts to get harder to hear'*).

No participant in the study could identify any non-technological interventions for hearing loss (Participant 12: *'I can't remember being told much about managing my hearing loss. They did give me a lot of gadgets, though. I have a volume control telephone, an FM system, and headphones for watching TV'*). Participant 17 responded to this question with *'Do you mean sign language?'* Several other participants reported that hearing aids were the only intervention they had ever been offered and that if there were any other choices, they were not aware of what they were (Participant 14: *'Well, aside from hearing aids, there really isn't anything else, is there?'*).

The majority of participants were aware of the limitations of hearing aids and the need for non-technological management strategies, but this knowledge did not emerge until they were asked what they believed their immediate family knew about managing a hearing loss. Participants overwhelmingly reported that their family mistakenly believed that hearing aids are intended to 'solve' hearing loss, and that once hearing aids have been acquired, communicative strategies such as attracting the participant's attention before speaking or turning on closed captioning are no longer necessary. Participant 14 said, *'My wife understands very little [about my hearing loss]. She doesn't take note of the fact that I can't hear, she speaks to me from behind… she doesn't know why I don't understand.'* Participant 9 reported that her husband, despite having a hearing loss himself, *'doesn't make any compensation for mine. I tap him on the shoulder to get his attention, but he doesn't do that for me… it hurts that I'm the one who always has to make allowances.'*

3.4.3 Clinician-led versus shared decision-making

As shown by the score ranges in Table 3-2, there was more individual variation in the responses to the Shared Decision-Making item than for any other item in the HLSM assessment. During the Cue and Response interview, some participants described a highly paternalistic, clinician-led style of practice (Participant 8: *'I was just told I needed hearing aids. I don't recall that there were any decisions about that per se, just "You need hearing aids" and that's that'*), while others described their relationship with their audiologist as a partnership (Participant 15: *'I'm able to say, "No, that's not good" or "I'd prefer something else". We make decisions together; she's really quite good about that'*). Participant 7 highlighted the importance of clinicians listening to clients and taking their experiences into account when making clinical decisions, saying, *'I respect their knowledge to a point, but I've got confidence in my own experience. The audiologist needs to hear what* I *need'*).

According to the responses to the Shared Decision-Making item, practice style seemed to vary on an individual clinician basis, even within the same clinical setting. For example, participants 1 and 18 attend the same clinic but see different audiologists. Participant 1 reported that *'[my audiologist] doesn't really communicate… there's not much of a relationship there. She tells me what to do and I go out and do it'*, whereas Participant 18 described his audiologist as *'very collaborative. She's very competent, empathetic… we decided together that it was time to go with stronger hearing aids. She'd suggested it some years back but I wasn't ready, so she was happy to wait.'*

Some participants expressed a preference for, or expectation of, a clinician-led style of practice on the grounds that the audiologist was the expert (Participant 2: *'They'll answer any questions I have but I don't have too many… they would tell me what I needed to do'*; Participant 14: *'The audiologist has always made the decisions. I don't know what I need, and they're the experts'*).

3.5 Discussion

The data elicited by the Partners in Health scale and the Cue and Response interview revealed an uneven distribution of HLSM skills in a sample of older adults who are current clients of the Australian HHC system. As a group, the study participants demonstrated a

sophisticated level of knowledge about hearing loss and appeared to face few barriers to accessing and engaging with HHC services. However, their knowledge of strategies for managing hearing loss was primarily limited to hearing aids and other technology-based interventions. More importantly, the majority of participants reported the presence of unmet psychosocial needs with no clear plan for addressing them as part of their current rehabilitation program. Participants reported social isolation; reduced value from social events; and feelings of anger, anxiety, and frustration arising from communicative interactions, yet few, if any, of these issues had been raised in past appointments with their audiologist. In some cases, participants reported that their audiologist did not ask them about their social or emotional wellbeing, whereas in others, participants were reluctant to raise these issues themselves, either because of personal discomfort or because they believed such problems were outside an audiologist's scope of practice. There was considerable individual variation with regard to the participants' reports of the clinical interaction style employed by their audiologist. Some participants reported that their relationship with their audiologist was a collaborative partnership, while others described a highly paternalistic, clinician-directed style of clinical practice. Taken as a whole, the results of the HLSM assessments suggest that the Australian HHC system is not meeting the needs of its clients equally in all areas.

The three themes that emerged from the verbal responses to the Cue and Response interview – clinician minimisation of the psychosocial impact of hearing loss, lack of client knowledge of non-technological interventions for hearing loss, and the use of clinician-led versus shared decision-making – reinforce what has been reported in the literature. In an analysis of client-clinician interaction patterns, Grenness, Hickson, Laplante-Lévesque, & Meyer (2014) found that the case histories obtained by audiologists tended to be weighted toward the identification of underlying biomedical issues, thus communicating to the client at the outset that the problems arising from hearing loss should be defined in biomedical terms. Further studies suggested that the application of a biomedical framework to the clinical decision-making process persists throughout the diagnosis and management planning stages, with less attention given to the psychosocial implications of the hearing loss (Grenness et al., 2015; Meyer, Barr, Khan, & Hickson, 2017).

A significant consequence of the biomedical approach to treating hearing loss is the firmly entrenched view that hearing aids are the default intervention in audiology, a perspective that was held by the participants in the current study. Despite evidence that there is

greater acceptance of an intervention when the client is offered the opportunity to choose from a range of options (Laplante-Lévesque, Hickson, & Worrall, 2012), client focus groups report that their individual preferences are rarely explored and hearing aids are often the sole intervention offered by the audiologist (Kelly et al., 2013; Pryce et al., 2016).

The continuum of clinical practice styles reported by participants in the current study broadly supports what has been reported in the literature. While a recent survey of Australian audiologists revealed a preference for, and theoretical understanding of, person-centred care (Laplante-Lévesque, Hickson, & Grenness, 2014), studies have demonstrated that audiologists do not necessarily practice in accordance with this belief (Ekberg et al., 2014; Kelly et al., 2013; Pryce et al., 2016). Person-centred care is an integral component of chronic condition management and refers to the idea that it is the person, not the health condition, who is being treated (World Health Organization, 2007). Person-centred care is conceptualised as an equal partnership between client and clinician in which health care is provided in a "holistic, individualised, respectful, and empowering" manner (Morgan & Yoder, 2012). It is diametrically opposed to a paternalistic, clinician-directed style of practice, in which the client is largely a passive recipient of treatment. A consequence of this paternalistic style is the expectation that the clinician, rather than the client, should take ultimate responsibility for the client's health and wellbeing, which is in turn linked with suboptimal adherence, satisfaction, and outcomes, both for hearing loss specifically (Knudsen, Nielsen, Kramer, & Jones, 2013; Laplante-Lévesque et al., 2012) and for chronic health conditions more generally (Bodenheimer et al., 2002; Wagner et al., 2001).

The open-ended format of the Cue and Response interview provided nuanced and individualised information about client needs that the Partners in Health scale alone did not. The scores on the Emotional Wellbeing and Social Life items of the Cue and Response interview were significantly lower than the Partners in Health score, suggesting that a questionnaire-based method of eliciting this information may underestimate the level of difficulty clients experience in these two domains. For the Social Life item, this may also be due to its focus on the quantity, rather than quality, of social interactions. It has been suggested in the literature that such a quantitative approach may overlook those clients who are attending as many social events as they always have, but who are now, as a result of their hearing loss, deriving less value from their social interactions (Keidser & Seeto, 2017). The cue questions on the Cue and Response interview, in contrast, are

intended to elicit qualitative details about the client's social life, and as such, may uncover important information that may otherwise never have come to light. This finding underscores the value of a collaborative assessment of HLSM rather than relying solely on the results of a client self-report measure. However, the valuable information obtained from an interview-style tool should be balanced with the need for clinical efficiency and the reality that clinicians cannot spend unlimited time with every client.

The mean difference between the Partners in Health scale and Cue and Response interview scores was, across the participant group, approximately one point (on an eight-point scale) for the Emotional Wellbeing and Social Life items. This difference was statistically significant. While there are no known studies that specifically examine differences in Partners in Health scale and Cue and Response scores, a study by Harvey et al. (2008) suggests that a one-point change has clinical significance when the tools are used to measure change over time. In a longitudinal study of 175 patients with a range of chronic conditions, Harvey et al. (2008) observed mean score changes of 1-2 points over the 18-month study period. These improvements corresponded to significant changes in a number of key health indicators, including the number of unplanned hospital visits, self-reported general health, perceived level of frustration with having a chronic condition, and self-reported health anxiety. This suggests that obtaining an accurate assessment of a client's self-management is important if the results will be compared to treatment outcome measures.

Our results suggest that several of the Partners in Health scale items have less relevance in an audiological context than they would for an individual with another chronic health condition, such as diabetes or asthma. While there is no question that the information elicited by the Healthy Lifestyle item is important for quality of life, it is of limited utility for audiologists, whose scope of practice does not extend to recommending changes to a client's dietary or exercise regimen. There does appear to be some value, however, in narrowing the scope of this question such that it focuses primarily on sleep habits and stress management. Several participants noted a bidirectional link between fatigue and their ability to understand speech, in line with findings that individuals recruit additional cognitive resources when listening under challenging acoustic conditions (Lemke & Besser, 2016) and that the increased listening effort put forth by people with hearing loss may result in greater sleep needs (Nachtegaal et al., 2009). Another participant reported that for him, high levels of stress were associated with more intrusive tinnitus, a

relationship that has also been suggested in the literature (Betz, Mühlberger, Langguth, & Schecklmann, 2017).

3.5.1 Study limitations

Use of the clinical tools in the Flinders Chronic Condition Management Program™, including the Partners in Health scale and the Cue and Response interview, is contingent upon successful completion of a two-day training workshop taught by the developers of the program. While the program's use by nurses and community health workers throughout Australia suggests that the training is not an insurmountable obstacle to clinical uptake of the tools, it is likely to be a barrier for many clinicians. Combined with the length of time required to administer the Partners in Health scale and the Cue and Response interview, we recommend that further modifications to the tools be undertaken, with a specific focus on end-user wishes and needs, before they can be considered ready for clinical use in audiology, either to assess the skills of individual clients or for larger-scale evaluations of aural rehabilitation programs. However, given the valuable qualitative information elicited from the Cue and Response interview, and the uniquely collaborative nature of the two assessment tools when used together, we recommend that the interview component not be sacrificed in favour of saving clinical time.

Caution should be exercised in generalising the results of this study to a wider population. The participants in this study had all volunteered to take part in a research study and were likely more highly motivated than the average member of the hearing-impaired community. Additionally, the participants were drawn from a geographic area of high socioeconomic status, meaning that they were less likely than average to face economic barriers to accessing HHC; this is supported by the fact that overall, the group attained high scores, with little individual variation, on the Attending Appointments and Accessing Services items of the Partners in Health scale. It is possible that a more diverse group of participants may have yielded different results. Similarly, the Cue and Response interviews were all administered by a single clinician. It is possible that the results of the study were influenced by the clinician’s skill set and experience level.

3.5.2 Future directions

Although the results of this study suggest that HLSM has the potential to play an important role in clinical practice, future research should focus on developing a HLSM assessment tool that more closely matches the unique needs of people with hearing loss. Further research in this area should extend beyond the identification of unmet needs to the development of interventions designed to address those needs, particularly in the area of psychosocial wellbeing.

3.6 Conclusion

The Partners in Health scale and the Cue and Response interview, two complementary tools for assessing self-management in clients with chronic conditions, were trialled with a group of older adults with hearing loss. The results confirm the current biomedical focus of the Australian HHC system and suggest that more should be done to identify and address the psychosocial issues arising from hearing loss. There is scope for further refining these tools such that they reflect the unique needs of people with hearing loss and provide clinical information that allows subsequent interventions to be more precisely tailored to the individual.

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Chapter 4. Predictors of hearing loss self-management in older adults

Chapter 3 confirmed the feasibility of assessing hearing loss self-management (HLSM) with modified versions of the Partners in Health scale and Cue and Response interview from the Flinders Chronic Condition Management Program™. Given that the tools enabled selective identification of self-management strengths and weaknesses, this chapter describes a study that aimed to determine whether HLSM encompassed the same domains as chronic condition self-management more generally and which personal factors predicted HLSM in each identified domain.

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4.1 Abstract

Purpose: To determine the factor structure of a clinical tool for the assessment of hearing loss self-management; and to identify predictors of the total score on the assessment and the extracted factor scores.

Materials and Methods: Hearing loss self-management assessments were conducted with 62 older adults. The factor structure of the assessment was determined with exploratory factor analysis. Multiple linear regression analysis was used to investigate whether there were significant contributors to the total score and to each of the extracted factors.

Results: Three factors were identified, each representing a distinct domain of hearing loss self-management: *Actions*, *Psychosocial Behaviours*, and *Knowledge*. The most common significant predictor was hearing health care experience, which predicted self-management overall and in the *Actions* and *Knowledge* domains. Health literacy predicted

hearing loss self-management overall and in the *Psychosocial Behaviours* domain. *Actions* were additionally predicted by hearing aid self-efficacy and gender, *Psychosocial Behaviours* by health locus of control, and *Knowledge* by age.

Conclusions: The results of the factor analysis suggested that hearing loss self-management is a multidimensional construct. Each domain of hearing loss self-management was influenced by different contextual factors. Subsequent interventions to improve hearing loss self-management should therefore be domain-specific and tailored to relevant contextual factors.

4.2 Introduction

Hearing loss, a disorder of the ear characterised by a reduction in auditory sensitivity and frequency selectivity (Moore, 2003), is the third leading cause of years lived with disability worldwide (World Health Organization, 2008). While a loss of sensitivity can be ameliorated to some extent with hearing aids or cochlear implants, permanent hearing loss is a chronic health condition that has significant negative effects on communication ability, psychosocial functioning, and quality of life (Chia et al., 2007; Gopinath et al., 2011; Kramer, Kapteyn, Kuik, & Deeg, 2002). The idea that the effects of a chronic condition extend beyond the impairment itself underpins the International Classification of Functioning, Disability and Health (ICF; World Health Organization, 2001). The ICF conceptualises functioning and disability in terms of their impact on a person at three interrelated levels: the body (structures and functions), the whole person (activities), and the whole person in a social context (participation). As a result of the activity limitations and participation restrictions imposed by a health condition, people with hearing loss – like others with a chronic condition – must acquire and apply a range of strategies to manage its effects on their everyday life, an active and ongoing process known as self-management (Barlow, Wright, Sheasby, Turner, & Hainsworth, 2002; Lorig & Holman, 2003).

A fundamental HLSM skill for many clients is the handling and management of hearing aids, which includes insertion into and removal from the ear canal, regular battery replacement, cleaning, and manipulation of the volume or program controls. After the initial hearing aid fitting and orientation, the client must put these skills into daily practice independently of the audiologist. However, evidence suggests that clients do not acquire

or retain these skills as well as they should. For example, a study by Desjardins and Doherty (2009) found that in a sample of experienced, full-time hearing aid users, the majority demonstrated poor performance on at least one hearing aid handling task. Poor hearing aid self-management can, in turn, give rise to larger consequences, such as irregular usage, decreased satisfaction and benefit, discontinuation of hearing aid use, and disengagement from hearing rehabilitation altogether (Bennett, Laplante-Lévesque, Meyer, & Eikelboom, 2018; Humes, Ahlstrom, Bratt, & Peek, 2009; McCormack & Fortnum, 2013).

At the activities and participation levels of functioning, HLSM further involves understanding the causes, characteristics, and effects of hearing loss; mastering problem-solving skills for use in communicative situations; monitoring for the development of new problems and responding appropriately; working collaboratively with hearing health care (HHC) professionals; and managing the effects of the hearing loss on psychosocial wellbeing (Convery, Meyer, Keidser, & Hickson, 2018). However, recent research suggest that these aspects of HLSM are largely overlooked in routine clinical practice in audiology. For example, Grenness et al. (2014) reported that audiologists tend to pose more questions about the medical and surgical history of the client's ears than about the psychosocial or functional difficulties the client is experiencing as a result of the hearing loss. The diagnosis is typically explained to the client in biomedical terms, rather than in terms of expected functional and communicative consequences (Grenness, Hickson, Laplante-Lévesque, Meyer, & Davidson, 2015). Client input is rarely solicited during discussions of rehabilitation strategies and hearing aids are often the sole intervention offered by the audiologist (Ekberg, Grenness, & Hickson, 2014; Kelly et al., 2013; Pryce, Hall, Laplante-Lévesque, & Clark, 2016). These clinical practice patterns were reflected in the findings of a recent study in which the Partners in Health scale and the Cue and Response interview, two complementary self-management assessment tools from the Flinders Chronic Condition Management Program™ (Battersby, Ask, Reece, Markwick, & Collins, 2003), were evaluated in a group of 30 older adults with hearing loss who had all been receiving HHC for ≥18 months (Convery, Keidser, Hickson, & Meyer, 2016; Convery et al., 2018). As a group, the study participants demonstrated relatively high levels of knowledge about hearing loss, but their knowledge of treatment options was largely confined to hearing aids and other technology-based interventions. The results of the self-management assessment also revealed the presence of unmet psychosocial needs in the majority of participants, who had no clear plan for addressing them as part of their current rehabilitation program.

In order to interpret the results of a self-management assessment for the purposes of clinical decision-making, clinicians must be alert to factors that may act as barriers or facilitators to good self-management in the individual client (Lawn et al., 2009). This is because the activity limitations and participation restrictions associated with a health condition do not arise solely from dysfunctioning at the level of the body. Rather, they result from an interaction between the health condition and the personal and environmental factors – collectively termed contextual factors by the ICF – that are present in the person's life. The ability to self-manage can itself be considered a personal factor; other contextual factors may additionally influence the extent to which people with chronic conditions are able to self-manage their activity limitations and participation restrictions (Lawn & Schoo, 2010). Consideration of contextual factors during diagnosis and management planning has been shown in other areas of health care to result in improved outcomes for adults with chronic conditions, including better adherence to treatment, fewer missed appointments, fewer unplanned visits to address urgent or emergency needs, increased quality of life, and decreased financial costs to the health care system (Mammen & Rhee, 2012; Reichsman, Werner, Cella, Bobiak, & Stange, 2009; Schwartz et al., 2012; Weiner et al., 2013). However, research into the effect of contextual factors on chronic condition self-management has traditionally been conducted on adults with diabetes, asthma, and mental illness and the way these conditions are managed in primary care settings. Comparatively limited evidence exists for hearing loss or for clinicians practicing in an allied health context (Howe, 2008; Meyer, Grenness, Scarinci, & Hickson, 2016; Stamm, Cieza, Machold, Smolen, & Stucki, 2006; Steiner et al., 2002). Further, much of the existing evidence base has focused on treatment adherence, with little attention paid to other domains of self-management, such as coping skills, participation in shared decision-making, and the ability to recognise and manage changes in symptoms. The first aim of this study was to identify the domains of self-management that are relevant to adults with hearing loss by determining the factor structure of the audiology version of the Flinders Chronic Condition Management Program™ assessment, which has been modified for use with adults with hearing loss. The second aim of the study was to identify those variables that predict the total score on the Flinders Chronic Condition Management Program™ assessment and each of the extracted factor scores.

4.3 Materials and methods

4.3.1 Participants

Data were drawn from 62 adults with hearing loss who had completed the study measures as part of a separate hearing aid field trial. The inclusion criteria were: (1) between 50 and 85 years of age; and (2) a four-frequency average (4FA; average of pure-tone thresholds at 0.5, 1, 2, and 4 kHz) between 25 and 65 dB HL. The exclusion criteria were: (1) presence of active ear disease; (2) non-English speaking; and (3) additional disabilities, such as dementia, that would preclude participation in a research study. Since the amount of available data was limited by the needs and resources of the field trial, an *a priori* power analysis to determine a sample size appropriate to the statistical techniques used in the present study was not conducted. This limitation is addressed Section 4.5.

4.3.2 Materials

4.3.2.1 Hearing loss self-management

HLSM was assessed with the audiology version of the Partners in Health scale and the Cue and Response interview from the Flinders Chronic Condition Management Program™. The original Partners in Health scale is a 12-item questionnaire that assesses self-management in the domains of knowledge, partnership in treatment, recognition and management of symptoms, and coping (Battersby et al., 2003; Smith, Harvey, Lawn, Harris, & Battersby, 2017). Clients are asked to rate each item from 0-8, with higher ratings reflecting better self-management. The aim of the Partners in Health scale is to obtain the client's perspective on his/her self-management without influence from the clinician. The four-factor structure of the scale has been confirmed with Bayesian confirmatory factor analysis (Smith et al., 2017). Cronbach's alpha was 0.82 in a sample of 176 adults with a range of chronic conditions, suggesting good internal consistency (Petkov, Harvey, & Battersby, 2010). The audiology version of the Partners in Health scale, which was used in the current study, was developed because the original scale employs more medical vocabulary (e.g. medication, doctor) than is typically used in an audiology consultation. The wording of each item was therefore revised, and one item removed, as the result of an iterative consultation process with seven adults with hearing loss (Convery et al., 2016). Revision of the scale was undertaken with written permission

from the developers of the Flinders Chronic Condition Management Program™. The original and audiology versions of the Partners in Health scale are shown in Table 3-1.

The Cue and Response interview is administered by the clinician, using open-ended questions to explore the client's understanding and knowledge of each item on the Partners in Health scale. For example, the cue questions associated with item 10, *I manage the effect of my hearing loss on my social life (e.g. my ability to participate, how I mix with other people, and my personal relationships)*, include *How does your hearing loss affect the way you socialise with other people? Tell me about the people who support you. What aspects of your social life would you like to change?* At the end of the discussion of each item, the clinician provides a rating on the same scale of 0 to 8 that was used in the Partners in Health scale. Client and clinician perspectives are then compared. When there is a discrepancy between clinician and client ratings of 3 or more, this signals an area for further discussion and provides an opportunity for the score to be adjusted. In the end, a single score is agreed upon for each item that reflects the perspectives of both the client and clinician. For the purposes of this paper, this score will be referred to subsequently as the HLSM score.

4.3.2.2 Health literacy

Health literacy was measured with the reading comprehension portion of the Australian version of the Short Test of Functional Health Literacy in Adults (Baker, Williams, Parker, Gazmararian, & Nurss, 1999; Barber et al., 2009). The client is presented with several paragraphs of health-related text from which one or two words are missing from each sentence. The task is to fill in each of the 36 blanks with the correct word, which is selected from a list of four choices. In a validation study on 211 adults, Cronbach's alpha was 0.97 for the reading comprehension portion of the Short Test of Functional Health Literacy in Adults, suggesting excellent internal consistency (Baker et al., 1999).

4.3.2.3 Health locus of control

The Multidimensional Health Locus of Control scales (Wallston, Strudler Wallston, & DeVellis, 1978) were used to measure locus of control – the extent to which individuals believe they can influence events that occur in their lives – in a health context. Three six-item subscales each reflect a different dimension of locus of control beliefs: internality,

powerful others, and chance externality. Clients are asked to rate each item on a scale from 1-6. Separate scores are reported for each of the three subscales. The developers of the Multidimensional Health Locus of Control scales report a Cronbach's alpha for the three subscales ranged from 0.67 to 0.77, suggesting acceptable internal consistency (Wallston et al., 1978).

4.3.2.4 Social support

Social support was assessed with the modified Medical Outcomes Study Social Support Survey (Moser, Stuck, Silliman, Ganz, & Clough-Gorr, 2012). The survey is an 8-item questionnaire that probes the extent to which an individual has access to social support in a variety of situations. Clients rate each item on a scale of 1-5; higher total scores indicate greater availability of social support. An evaluation of the survey's psychometric properties suggests that the instrument is internally reliable (Cronbach's alpha = 0.88-0.93 across different populations) and is able to reliably discriminate between groups of clients whose actual social resources are known, particularly among older adults (Moser et al., 2012).

4.3.2.5 Problem-solving skills

Problem-solving was measured using the Twenty Questions Test, a subtest of the Delis-Kaplan Executive Function System (Delis, Kaplan, & Kramer, 2001). Clients are shown a set of 30 pictures laid out in a 5 x 6 grid; each picture shows a common, everyday object. Clients are instructed to identify an image chosen by the test administrator by asking as few yes/no questions as possible, to a maximum of 20 questions. Lower scores reflect better problem-solving skills. The Delis-Kaplan Executive Function System was standardised on a sample of 1,750 Americans ranging from 8 to 89 years of age; internal consistency within this normative population was moderate to high (Delis, Kramer, Kaplan, & Holdnack, 2004).

4.3.2.6 Cognitive function

Cognitive function was assessed with the Montreal Cognitive Assessment (Nasreddine et al., 2005), a screening instrument that taps into the domains of visuospatial and executive function, memory, attention, language, abstraction, delayed recall, and orientation to time and place. Item analysis has shown that the test can reliably distinguish adults with mild

cognitive impairment from adults with confirmed Alzheimer's dementia as well as from normal controls (Nasreddine et al., 2005). The developers of the Montreal Cognitive Assessment reported a Cronbach's alpha of 0.83, suggesting good internal consistency. It has been reported that clients with hearing loss score more poorly on the Montreal Cognitive Assessment than do their normal-hearing peers due to the presentation of some items via an auditory-only modality (Dupuis et al., 2015). However, since removal of these items could negatively affect the validity of the test, and since there is no currently available version that is specifically designed for clients with hearing loss, the original administration and scoring methods were employed. Recommended procedures for administering the Montreal Cognitive Assessment to clients with hearing loss were followed, which included ensuring that clients were wearing their hearing aids during testing, if applicable, and conducting the assessment in a well-lit room with little to no ambient noise (Dupuis et al., 2015).

4.3.2.7 Hearing aid self-efficacy

The Measure of Audiologic Rehabilitation Self-Efficacy for Hearing Aids (West & Smith, 2007) is a 24-item measure of self-efficacy for successful use and management of hearing aids. Clients are instructed to report how certain they are that they would be able to cope with a particular listening situation or perform a hearing aid-related skill on a scale of 0-100%. Each of the four subscales (basic handling, advanced handling, aided listening, and adjustment) has good internal consistency, with Cronbach's alpha values ranging from 0.77-0.93 for new hearing aid users and 0.67-0.91 for experienced hearing aid users. In the initial validation study, test-retest reliability was high for both user groups, for the total scale, and for each individual subscale (West & Smith, 2007).

4.3.2.8 Demographic data

Information about age, gender, and HHC experience was gathered with a questionnaire. Socioeconomic status was determined according to decile rankings assigned to Australian suburbs by the Australian Bureau of Statistics' Socio-Economic Indexes for Areas. Decile rankings range from 1 (lowest) to 10 (highest) and are a measure of economic advantage relative to other areas of Australia. Severity of hearing loss was measured with pure-tone audiometry and reported as the average of the hearing thresholds obtained at 0.5, 1, 2, and 4 kHz across both ears, with higher values indicating greater severity.

4.3.3 Procedure

During one test appointment of approximately two hours, participants independently completed the Partners in Health scale, the demographic questionnaire, the Multidimensional Health Locus of Control scales, and the Measure of Audiologic Rehabilitation Self-Efficacy for Hearing Aids, while the Cue and Response interview, pure-tone audiometry, the Twenty Questions Test, and the Montreal Cognitive Assessment were administered by the first author (EC), a qualified audiologist with 16 years of clinical experience. The Short Test of Functional Health Literacy in Adults and the modified Medical Outcomes Study Social Support Survey were mailed to the participants between 1 and 5 months after the participants underwent the face-to-face assessments. The study was approved by and conducted under the ethical oversight of the Australian Hearing Human Research Ethics Committee and the University of Queensland Medical Research Ethics Committee and conformed in all respects to the Australian government's National Statement on Ethical Conduct in Human Research (National Health and Medical Research Council, 2007). Participants were compensated for their travel expenses.

4.3.4 Statistical analysis

All statistical analysis was performed using IBM SPSS Statistics (v24, 2016). The factor structure of the HLSM assessment was determined using exploratory factor analysis with the principal components extraction method. One item in the assessment, Healthy Lifestyle, was excluded from the analysis due to its lack of correlation with the other items ($r = 0.16$). Factors were retained if they had an eigenvalue > 1 (Kaiser, 1960) and they appeared above the "elbow" of the scree plot (Cattell, 1966; Costello & Osborne, 2005), followed by confirmation that the total variance explained was at least 70%. Direct oblimin (i.e. non-orthogonal) rotation was used to allow correlation between the factors (Costello & Osborne, 2005). Following rotation, it was confirmed that the rotated factors had a sensible interpretation. Sampling adequacy was confirmed with the Kaiser-Meyer-Olkin measure and Bartlett's test of sphericity.

For the total score on the HLSM assessment, and for each of the extracted factors, a standard multiple linear regression model was fitted to the data to determine how much variation in HLSM could be explained by the combined contributions of the independent variables. Variables that displayed a non-normal distribution were transformed prior to the

analysis using square root or logarithmic transformations depending on the degree of skewness (Osborne, 2002). Multiple imputation, with pooled results calculated over 30 imputations, was used to compensate for the fact that 35% of the participants did not return their health literacy assessment and 24% did not return their social support questionnaire, both of which had been sent to participants in the post 1-5 months after the face-to-face self-management assessment (Graham, Olchowski, & Gilreath, 2007). For the total score on the HLSM assessment, and for each of the extracted factors, a univariate linear regression analysis was performed on each independent variable with the aim of identifying those that made significant ($p < 0.1$) individual contributions to the model. Only those independent variables with significant p values were retained for subsequent multivariate analysis. The data set for each regression model was evaluated to ensure it met the necessary assumptions, namely independence of observations, linearity, homoscedasticity, a lack of significant multicollinearity, an absence of outliers, and a normal distribution of residuals (Tabachnick & Fidell, 2013).

4.4 Results

4.4.1 Participant characteristics

Participants ranged in age from 51 to 85 years, with a mean age of 72 years (SD = 7.2 years) and a mean PTA4 of 43 dB HL (SD = 10.3). Twenty-one participants were female and 41 were male. The female participants had a mean age of 71 years (SD = 8.2 years) and a mean PTA4 of 42 dB HL (SD = 8.5). The male participants had a mean age of 73 years (SD = 6.6 years) and a mean PTA4 of 43.7 dB HL (SD = 11.1). Half of the study participants were current recipients of HHC and had been so for 1.5 to 37 years. The other half of the participant group had never received HHC.

4.4.2 Exploratory factor analysis

Three factors with eigenvalues > 1 were extracted, which explained 47.9%, 15.6%, and 11.2% of the total variance, respectively. All three factors were retained after inspection of the scree plot. With three factors, the total percentage of variance explained was 74.7%, which was considered adequate. As shown in
Table 4-1, the items Attending Appointments, Adherence, Shared Decision-Making, Taking Action, Accessing Services, and Monitoring Changes loaded onto factor 1, which was

named *Actions*. The items Emotional Wellbeing and Social Life loaded onto factor 2, which was named *Psychosocial Behaviours*. The items Knowledge of Treatment and Knowledge of Hearing Loss loaded onto factor 3, which was named *Knowledge*. The sensible interpretation of the extracted factors contributed to the decision to retain a three-factor solution.

Table 4-1. Rotated pattern matrix for exploratory factor analysis with direct oblimin rotation of the HLSM assessment

Item	Rotated Component Coefficients		
	Factor 1 *Actions*	Factor 2 *Psychosocial Behaviours*	Factor 3 *Knowledge*
Attending Appointments	**0.899**	-0.010	0.165
Adherence	**0.874**	-0.055	-0.126
Shared Decision-Making	**0.840**	-0.071	-0.106
Taking Action	**0.783**	0.044	0.078
Accessing Services	**0.780**	0.013	-0.181
Monitoring Changes	**0.471**	0.234	-0.412
Emotional Wellbeing	0.073	**0.854**	0.062
Social Life	-0.100	**0.846**	-0.044
Knowledge of Treatment	0.043	-0.125	**-0.903**
Knowledge of Hearing Loss	-0.019	0.108	**-0.893**

4.4.3 Hearing loss self-management assessment total score

Of the 13 independent variables, six were significantly associated with the total score on the HLSM assessment in the univariate analyses: HHC experience, health literacy, health locus of control (powerful others), problem-solving skills, age, and hearing aid self-efficacy (Table 4-2). All six significant variables were entered into a standard multiple linear regression model to predict the total score on the HLSM assessment. Two of the independent variables, HHC experience and health literacy, made significant contributions to the multivariate model. A significant regression equation was found for the final model ($F(2,59) = 16.04$, $p < 0.0005$), with an adjusted R^2 of 0.33 (Table 4-3). The predicted total score on the HLSM assessment is equal to 27.68 + 18.14 (HHC EXPERIENCE) + 9.54 (HEALTH LITERACY), where HHC experience is coded as 0 = No Experience and 1 =

Experience and health literacy is measured in terms of a test score. Higher total scores on the HLSM assessment indicate better self-management skills. Recipients of HHC had total HLSM scores that were 18.14 points higher than those who had never received HHC. Total scores on the HLSM assessment increased by 9.54 for every one-point increase in health literacy.

Table 4-2. Mean values of each variable, with the standard deviation shown in parentheses, for the participant group (N = 62)

Variable		Univariate p values			
		HLSM total score	*Actions* factor	*Psychosocial Behaviours* factor	*Knowledge* factor
HLSM total score	59.8 (17.2)				
Age (years)	72.1 (7.2)	0.03*	0.16	0.18	0.01*
Gender (M:F ratio)	66:34	0.15	0.09*	0.83	0.84
Socioeconomic status	8.3 (2.4)	0.64	0.61	0.44	0.63
Hearing loss severity (dB HL)	43.0 (10.3)	0.17	0.09*	0.51	0.63
Social support	32.5 (6.3)	0.53	0.81	0.03*	0.26
Health literacy	35.2 (1.4)	0.08*	0.22	0.02*	0.18
Cognitive function	26.1 (2.8)	0.25	0.76	0.06*	0.02*
Hearing aid self-efficacy (%)	83.4 (11.6)	0.008*	0.006*	0.38	0.22
Health locus of control – internal	26.4 (3.9	0.70	0.69	0.05*	0.35
Health locus of control – chance	15.9 (5.4)	0.47	0.94	0.09*	0.18
Health locus of control – powerful others	21.5 (5.9)	0.04*	0.14	0.10*	0.06*
Problem-solving skills	12.1 (2.3)	0.08*	0.08*	0.46	0.11
HHC experience (years)	5.0 (7.8)	<0.0005*	<0.0005*	0.12	<0.0005*

Note. For the independent variables, univariate p values indicate the significance of the association between each independent variable and the total and factor scores on the HLSM assessment. Variables for which p < 0.10 were considered significant and are marked with an asterisk. Higher values on the HLSM total score, Actions factor score, and Psychosocial Behaviours factor score indicate better self-management, while higher values on the Knowledge factor score indicate poorer self-management. The variable HHC experience was converted to a dichotomous categorical variable (experience/no experience) prior to the regression analyses. Scores on the health locus of control chance and powerful others variables have been reversed so that higher values on all locus of control measures indicate a more internally oriented locus of control.

4.4.4 Hearing loss self-management assessment: Actions

Five independent variables were significantly associated with the *Actions* factor score in the univariate analyses: hearing aid self-efficacy, gender, HHC experience, problem-solving skills, and hearing loss severity (Table 4-2). The variables were entered into a multiple linear regression model. HHC experience, hearing aid self-efficacy, and gender, made significant contributions to the multivariate model. A significant regression equation was found for the final model ($F(3,58) = 14.32$, $p < 0.0005$), with an adjusted R^2 of 0.40 (Table 4-3). The predicted *Actions* factor score is equal to -2.49 + 1.01 (HHC EXPERIENCE) + 0.02 (HEARING AID SELF-EFFICACY) + 0.54 (GENDER), where HHC experience is coded as 0 = No Experience and 1 = Experience, hearing aid self-efficacy is measured as a percentage, and gender is coded as 0 = Male and 1 = Female. Higher factor scores indicate better self-management skills in the *Actions* domain. Recipients of HHC had *Actions* factor scores that were 1.01 points higher than those who had never received HHC. Female participants had *Actions* factor scores that were 0.54 points higher than male participants. *Actions* factor scores increased by 0.02 points for every percentage point increase in hearing aid self-efficacy.

Table 4-3. Multiple linear regression models for the HLSM assessment total score and the *Actions, Psychosocial Behaviours*, and *Knowledge* factors

Variable	HLSM total score (adj. R^2 = 0.33)						
	B	SE_B	β	t	p	95% CI for B Lower bound	95% CI for B Upper bound
HHC experience	18.14	3.62	0.53	5.02	<0.0005	10.90	25.38
Health literacy	9.54	3.41	0.30	2.81	0.02	2.71	16.37
Variable	*Actions* factor (adj. R^2 = 0.40)						
	B	SE_B	β	t	p	95% CI for B Lower bound	95% CI for B Upper bound
HHC experience	1.01	0.20	0.51	4.98	<0.0005	0.60	1.42
Hearing aid self-efficacy	0.02	0.01	0.25	2.45	0.02	0.01	0.04
Gender	0.54	0.21	0.26	2.56	0.01	0.12	0.95
Variable	*Psychosocial Behaviours* factor (adj. R^2 = 0.20)						
	B	SE_B	β	t	p	95% CI for B Lower bound	95% CI for B Upper bound
Health literacy	0.61	0.22	0.33	2.74	0.02	0.16	1.06
Health locus of control – internal	0.07	0.03	0.26	2.17	0.04	0.01	0.13
Variable	*Knowledge* factor (adj. R^2 = 0.30)						
	B	SE_B	β	t	p	95% CI for B Lower bound	95% CI for B Upper bound
HHC experience	0.61	0.22	0.33	2.74	0.02	0.16	1.06
Age	0.07	0.03	0.26	2.17	0.04	0.01	0.13

Note. B = unstandardised regression coefficient; SE_B = standard error of the coefficient; β = standardised coefficient

4.4.5 Hearing loss self-management assessment: Psychosocial Behaviours

Univariate analyses revealed that five independent variables were significantly associated with the *Psychosocial Behaviours* factor score: health literacy, health locus of control (internal), health locus of control (powerful others), social support, and cognitive function (Table 4-2). The variables were entered into a multiple linear regression model. Health literacy and health locus of control (internal) made significant contributions to the multivariate model. A significant regression equation was found for the final model ($F(2,59) = 6.24$, $p = 0.009$), with an adjusted R^2 of 0.20 (Table 4-3). The predicted *Psychosocial Behaviours* factor score is equal to -3.20 + 0.61 (HEALTH LITERACY) + 0.07 (HEALTH LOCUS OF CONTROL INTERNAL), where both independent variables are measured in terms of test scores. Higher factor scores indicate better self-management skills in the *Psychosocial Behaviours* domain. *Psychosocial Behaviours* factor scores increased by 0.61 for every one-point increase in health literacy and 0.07 for every one-point increase in internal health locus of control.

4.4.6 Hearing loss self-management assessment: Knowledge

Five independent variables were significantly associated with the *Knowledge* factor score: age, health literacy, cognitive function, health locus of control (powerful others), and HHC experience (Table 4-2). All five significant variables were entered into a multiple linear regression model. HHC experience and age made significant contributions to the multivariate model. A significant regression equation was found for the final model ($F(2,59) = 13.86$, $p < 0.0005$), with an adjusted R^2 of 0.30 (Table 4-3). The predicted *Knowledge* factor score is equal to -2.95 – 0.92 (HHC EXPERIENCE) + 0.47 (AGE), where HHC experience is coded as 0 = No Experience and 1 = Experience and age is measured in years. Lower factor scores indicate better self-management skills in the *Knowledge* domain. Recipients of HHC had *Knowledge* factor scores that were 0.92 points lower than those who had never received HHC. *Knowledge* factor scores increased by 0.47 for every additional year of age.

4.5 Discussion

The ICF conceptualises health and disability as multidimensional, acknowledging that chronic conditions affect not just the impaired body structure or function, but also give rise

to activity limitations and participation restrictions (World Health Organization, 2001). Using hearing loss as an example, a reduction in audibility (impairment of function) may result from a loss of outer hair cells in the cochlea (impairment of structure), which may, in turn, cause difficulty hearing on the telephone (activity limitation) and thus restrict a person's ability to engage in full-time work (participation restriction) (Audiology Australia, 2014). The extent to which a chronic condition affects a person on each of these levels is further influenced by the contextual factors that are present in his or her life. We suggest that self-management, an important contributor to chronic condition outcomes (Barlow et al., 2002; Lorig & Holman, 2003), be considered a personal contextual factor since it falls within the "attitudes, basic skills, and behaviour patterns" (Grotkamp, Cibis, Nüchtern, von Mittelstaedt, & Seger, 2012) that can influence the impact of the condition on activities and participation. However, while self-management is an acknowledged and well-researched contextual factor as it influences chronic conditions such as diabetes and arthritis, it remains a relatively underexplored area in the context of hearing loss.

In this study, we measured HLSM using the Partners in Health scale and the Cue and Response interview, two validated tools that assess self-management holistically (Battersby et al., 2003) and which have been modified specifically for use with adults with hearing loss (Convery et al., 2016). Factor analysis of the original Partners in Health scale has demonstrated that among adults with a range of chronic conditions (excluding hearing loss), the scale is composed of four factors: *Knowledge*, *Partnership in Treatment*, *Recognition and Management of Symptoms*, and *Coping* (Smith et al., 2017). In our sample, which included only older adults with hearing loss, the items that loaded onto the *Knowledge* and *Coping* factors (which we termed *Knowledge* and *Psychosocial Behaviours*, respectively) were the same. This suggests that the self-management skills represented by these factors – which include knowing about one's condition and its treatment options and managing the emotional and social effects of the condition – are equally relevant for hearing loss as they are for conditions like diabetes and arthritis. However, unlike the original analysis, the *Partnership in Treatment* items and the *Recognition and Management of Symptoms* items all loaded onto a single factor in our study, which we named *Actions* (see Table 3-1). Our results may reflect the lesser importance of symptom monitoring for clients with hearing loss relative to those with other chronic conditions. In contrast to diabetes and asthma, hearing loss tends to be relatively stable for most clients; as such, monitoring tends to be less structured and to take place over a period of months or years, rather than on a daily basis. Similarly, the item Healthy

Lifestyle was excluded from our factor analysis because it was poorly correlated with the other items, whereas this item loaded onto the *Coping* factor in the original analysis. This finding highlights another key difference between hearing loss and many other chronic conditions, namely that hearing loss rarely affects – and is rarely affected by – such lifestyle habits as diet and exercise. Taken as a whole, the results of our factor analysis suggest that while there is considerable overlap between the self-management domains that apply to hearing loss and those that apply to other chronic conditions, there is scope for developing self-management assessments and interventions that are more precisely aligned to the unique nuances of living with a hearing loss.

Not only do contextual factors influence a person's experience of a chronic condition and its associated functional impairments, activity limitations, and participation restrictions, they also interact with each other. In this study we examined the relationships between the identified domains of self-management and a range of other personal factors. While these relationships have been investigated for other chronic conditions, there is a paucity of evidence that relates specifically to older adults with hearing loss. In the present sample of 62 older adults, we found that clients who had previously received HHC possessed significantly better HLSM skills than those who had never received HHC, both in the *Knowledge* and *Actions* domains as well as overall. However, HHC experience was not significantly associated with HLSM in the *Psychosocial Behaviours* domain. This finding could reflect the fact that audiologists tend to relay primarily factual information about hearing loss and hearing aids to their clients (e.g. a description of the audiogram, an explanation of a hearing aid's technical specifications) and prioritise technology-based interventions over the recommendation of strategies for managing the psychosocial aspects of living with a hearing loss (Ekberg et al., 2014; Kelly et al., 2013; Meyer, Barr, Khan, & Hickson, 2017; Pryce et al., 2016).

Health literacy emerged as another important factor influencing HLSM, with significant effects on the *Psychosocial Behaviours* domain as well as the total score. The relationship between health literacy and self-management among older adults with hearing loss reinforces what has been reported for adults with diabetes, asthma, and chronic obstructive pulmonary disease, namely that those with higher levels of health literacy demonstrate better self-management knowledge and skills (Disler, Gallagher, & Davidson, 2011; Federman et al., 2014; Kripalani, Gatti, & Jacobson, 2010; Mackey, Doody, Werner, & Fullen, 2016). In the context of hearing loss, a link has also been demonstrated between

poor health literacy and a reduced ability to manage the daily tasks associated with using and caring for hearing aids (Caposecco, Hickson, Meyer, & Khan, 2016), an important component of HLSM for the majority of clients.

The variable influence of these personal factors on HLSM underscores the need for the clinician to consider such factors on an individual basis so that interventions can be tailored to the activity limitations and participation restrictions that are experienced by each client. Selection of an appropriate self-management intervention may be further influenced by whether relevant contextual factors are fixed, i.e. intrinsic to the individual, or potentially modifiable. In addition to HHC experience and health literacy, health locus of control, age, gender, and hearing aid self-efficacy emerged as significant contributors to individual domains of HLSM in the present study. While fixed factors such as health literacy, health locus of control, age, and gender may influence the form and content of the chosen self-management intervention, a modifiable factor like self-efficacy could be targeted for intervention in and of itself. Indeed, leading self-management education programs, such as the Flinders Chronic Condition Management Program™ and the Stanford Program, explicitly incorporate activities to enhance client self-efficacy, with the expectation that improved self-efficacy will lead to better self-management (Foster, Taylor, Eldridge, Ramsay, & Griffiths, 2007; Lawn & Schoo, 2010).

The proportion of variance in HLSM that could be predicted by the independent variables was relatively low, as indicated by adjusted R^2 values that ranged from 0.20 to 0.40. This finding suggests at least two possible conclusions. First, it is likely that there are a number of other factors exerting influence on HLSM that were not measured in the present study. For example, health beliefs have been shown in studies of other chronic conditions to influence a client's ability to self-manage (Ryan, 2009). There is increasing evidence that health beliefs influence client outcomes within HHC, with recent studies reporting that clients who perceive fewer barriers to living successfully with a hearing loss demonstrate greater rates of hearing aid uptake and more regular hearing aid usage (Hickson, Meyer, Lovelock, Lampert, & Khan, 2014; Meyer, Hickson, Lovelock, Lampert, & Khan, 2014; Saunders, Frederick, Silverman, & Papesh, 2013). Second, despite findings that many contextual factors are common to a range of chronic conditions and population subgroups, the influence they exert may not necessarily be predictable or straightforward. For example, in a qualitative study of adults with end-stage renal disease, Griva et al. (2013) found that while family members provided both tangible and emotional support for self-

management, social pressures could also conspire to reduce adherence to dietary restrictions and medication schedules at events that centred on food.

The results of this study should be considered in the context of several limitations. First, an *a priori* power analysis was not conducted to determine an appropriate sample size for exploratory factor analysis and multiple linear regression. This is because the data used in the present study had been collected as part of a separate hearing aid field trial; the needs and resources of the field trial limited the amount of data available for the present study. However, *a posteriori* evaluations of the analyses suggest that the sample size of 62 was sufficient to yield results of reasonable quality. A series of simulations conducted by deWinter, Dodou, and Wieringa (2009) suggest that exploratory factor analysis can be successfully carried out with small sample sizes (i.e. $N < 50$) as long as the factor loadings and number of variables are high and the number of factors is low. The level of factor loadings was identified by deWinter et al. (2009) as the strongest determinant of a reliable result. In our exploratory factor analysis, all factor loadings were ≥ 0.78, which is considered by deWinter et al. (2009) to be very high, with the exception of one variable whose factor loading was 0.47. Our exploratory factor analysis included 10 variables (a medium number of variables) and the result was a three-factor solution (a low number of factors). On this basis, we conclude that the results of our exploratory factor analysis are likely to be reliable. With respect to the multiple linear regression analyses, *a posteriori* calculations of achieved power were ≥ 90% for all four models. Again, we conclude that the results of our multiple linear regression analyses are likely to be robust and reliable.

Second, health literacy and social support were assessed by mailing the Short Test of Functional Health Literacy in Adults and the modified Medical Outcomes Study Social Support Survey to the participants between 1 and 5 months after their self-management had been assessed face-to-face. Approximately half of the participants received their health literacy and social support questionnaires 1-2 months after the self-management assessment; the other half did so 3-5 months after the self-management assessment. It is unknown to what extent this delay could have affected the results. The psychometric characteristics of the Short Test of Functional Health Literacy in Adults that have been published to date do not include a measure of test-retest reliability (Baker et al., 1999). However, stability coefficients reported by the developers of the modified Medical Outcomes Study Social Support Survey suggest a high degree of repeatability over the course of one year (Sherbourne & Stewart, 1991). A change in circumstances since the

self-management assessment, such as a change in social support availability or neurological changes as the result of a stroke, cannot be excluded.

Third, the published psychometric characteristics of the Short Test of Functional Health Literacy in Adults reflect a face-to-face administration mode, whereas participants in the present study received the test in the mail and completed it at home independently of the experimenters. Although independent completion of an electronic version of the test has been previously investigated and found to yield results equivalent to those obtained via the traditional face-to-face administration mode (Chesser, Keene Woods, Wipperman, Wilson, & Dong, 2014), we cannot exclude the possibility that use of a non-standard method of administration influenced the test results. Further, as a result of how the Short Test of Functional Health Literacy in Adults and the modified Medical Outcomes Study Social Support Survey were administered, a proportion of the health literacy and social support data was missing because not all participants returned their questionnaires. While this was compensated for statistically using multiple imputation, it is possible that the influence of these variables on self-management could have been over- or underestimated in the regression analyses.

Fourth, cognitive function was assessed with the Montreal Cognitive Assessment, an instrument that has been found to overidentify impaired cognitive function in adults with hearing loss due to the number of items that are administered via an auditory-only modality (Dupuis et al., 2015). While it is possible that this may have occurred with our sample, we took a number of steps to mitigate this effect. The experimenter who conducted the cognitive assessments, a qualified audiologist with 16 years of experience working with older adults with hearing loss, ensured that testing was conducted in a quiet, well-lit room and that where possible, participants were wearing appropriate amplification, two strategies recommended by Dupuis et al. (2015). We also note that the average PTA4 in our participant group was 43 dB HL (SD = 10.3), which corresponds to a mild to moderate hearing loss. Individuals with moderate hearing loss, even unaided, would typically be able to understand clearly spoken speech in an environment without background noise (Clark, 1981). During data analysis, the scores on the Montreal Cognitive Assessment were analysed as a continuous variable; participants were not classified on the basis of these scores as having impaired versus unimpaired cognitive function. We further note that the correlation between the Montreal Cognitive Assessment score and hearing loss severity was not significant (r = -0.20, p = 0.12).

Fifth, two of the factors identified in the factor analysis, *Knowledge* and *Psychosocial Behaviours*, consisted of only two items. Standard practice in exploratory factor analysis dictates that at least three items should load on each extracted factor to ensure the solution is statistically robust (Costello & Osborne, 2005). Conceptually, however, the three-factor solution presented here seemed the most sensible interpretation of the data. The items that loaded onto each factor have a great deal in common with each other but very little in common with the other items. For example, the Knowledge of Health Condition and Knowledge of Treatment items, which loaded onto the *Knowledge* factor, represent a set of self-management activities that are distinct from those represented by the *Psychosocial Behaviours* and *Actions* factors. We note that in the factor analysis conducted by Smith et al. (2017) on the original Partners in Health scale, two of the extracted factors (*Recognition and Management of Symptoms* and *Knowledge*) also consisted of only two items. However, this may reflect a weakness of the original self-management assessment itself and suggests that there is scope for its further refinement.

Sixth, the study sample was relatively small and uniform in terms of socioeconomic status, race, and ethnicity, which limits generalisability. It is possible that different and more variable groups of participants would have yielded a different set of predictive factors. It is therefore recommended that additional studies investigating predictors of HLSM be conducted with larger and more diverse groups of participants.

4.6 Conclusion

HLSM is a multidimensional construct, encompassing the domains of *Actions*, *Psychosocial Behaviours*, and *Knowledge*. Our findings suggest that there is considerable overlap between the domains of self-management that are relevant for hearing loss and those that apply to other chronic conditions, such as knowing about one's condition and its treatment options and managing the social and emotional effects of the condition on everyday life. Other aspects of self-management, however, such as monitoring for and responding to changes in one's condition and maintaining healthy lifestyle habits, appeared less relevant to hearing loss than they are for chronic conditions that require daily monitoring or exert an effect on physical functioning, such as diabetes and arthritis.

Our results further suggest that HLSM, a personal contextual factor in its own right, interacts with other personal factors, including previous HHC experience, health literacy,

hearing aid self-efficacy, gender, health locus of control, and age. The relationship between these factors and HLSM varied according to the specific self-management domain under analysis. Interventions to improve HLSM should thus be domain-specific and tailored to the personal factors that are relevant for the individual client.

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Chapter 5. The relationship between hearing loss self-management and hearing aid benefit and satisfaction

Chapter 4 identified three domains of hearing loss self-management (HLSM): *Knowledge*, *Actions*, and *Psychosocial Behaviours*, each of which was predicted by a different set of personal factors. While these domains differed slightly from those reported in the literature for other chronic conditions, the results of that study confirmed that HLSM, like self-management more generally, is a multidimensional construct. This chapter aims to determine whether HLSM is clinically relevant to hearing rehabilitation with older adults by examining the extent to which HLSM in the *Knowledge*, *Actions*, and *Psychosocial Behaviours* domains is associated with hearing aid benefit and satisfaction.

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5.1 Abstract

Purpose: Hearing loss self-management refers to the knowledge and skills people use to manage the effects of hearing loss on all aspects of their daily life. The purpose of this study was to investigate the relationship between self-reported hearing loss self-management and hearing aid benefit and satisfaction.

Method: Thirty-seven adults with hearing loss, all of whom were current users of bilateral hearing aids, participated in this observational study. The participants completed self-report inventories probing their hearing loss self-management and hearing aid benefit and satisfaction. Correlation analysis was used to investigate the relationship between

individual domains of hearing loss self-management and hearing aid benefit and satisfaction.

Results: Participants who reported better self-management of the effects of their hearing loss on their emotional wellbeing and social participation were more likely to report less aided listening difficulty in noisy and reverberant environments and greater satisfaction with the effect of their hearing aids on their self-image. Participants who reported better self-management in the areas of adhering to treatment, participating in shared decision-making, accessing services and resources, attending appointments, monitoring for changes in their hearing and functional status, and taking action to address those changes were more likely to report greater satisfaction with the sound quality and performance of their hearing aids.

Conclusions: Study findings highlight the potential for using information about a client's hearing loss self-management in different domains as part of clinical decision-making and management planning.

5.2 Introduction

Permanent hearing loss is a chronic condition that exerts significant effects on an individual's communicative functioning, health-related quality of life (HRQoL), and psychosocial wellbeing (Bainbridge & Wallhagen, 2014; Chia et al., 2007; Kramer, Kapteyn, Kuik, & Deeg, 2002). The multidimensional experience of a chronic condition can be described using the International Classification of Functioning, Disability and Health (ICF), a biopsychosocial model of health and disability (World Health Organization, 2001). According to the ICF, health is experienced at three interrelated levels of functioning: body functions and structures, activities, and participation. Disability refers to dysfunctioning at one or more of these levels, for which the corresponding terms impairments, activity limitations, and participation restrictions are used (World Health Organization, 2001). In the context of hearing loss, for example, a loss of cochlear outer hair cells (impairment of structure) can cause a reduction in spectral and temporal resolution (impairment of function). These impairments may lead to difficulty hearing on the telephone (activity limitation) and thus restrict a person's ability to work in jobs that require frequent telephone use (participation restriction) (Audiology Australia, 2014; Danermark, Granberg, Kramer, Selb, & Möller, 2013). Environmental factors (e.g. family support, employment policies,

societal attitudes) and personal factors (e.g. age, level of education, coping style) can serve as barriers or facilitators to functioning at any or all of these levels (World Health Organization, 2001). For the example described above, the person's friends and family may choose to communicate with her via text messaging or email instead of the telephone (environmental facilitator), whereas the person's employer may require her to answer telephone calls in a noisy open-plan office (environmental barrier). The person may be sufficiently self-confident to request accommodations in the workplace to enable her to optimally perform her duties (personal facilitator), or she may do nothing because she believes she has no control over how the requirements of her job must be fulfilled (personal barrier). In summary, the ICF framework conceptualises functioning and disability as arising from an interaction between a person's health state and the contextual factors that are present in the person's life (World Health Organization, 2001).

The ability to self-manage a chronic condition can be considered one of the personal factors that influences a person's experience of that condition. Self-management refers to the knowledge and skills that are used to manage the effects of a chronic condition on all aspects of daily life (Barlow, Wright, Sheasby, Turner, & Hainsworth, 2002; Convery, Hickson, Keidser, & Meyer, 2019; Lorig & Holman, 2003). Self-management domains encompass not only the ongoing use and management of prescribed interventions, but also involves maintaining physical and emotional wellbeing; monitoring for and responding to changes in condition severity and functional status; seeking out information, resources, and support; and taking an active role in clinical decision-making (Battersby & Lawn, 2009; Clark et al., 1991). A recent study has suggested that there is considerable overlap in the domains of self-management that have been identified for chronic conditions such as diabetes, arthritis, and mental illness and those that are relevant for hearing loss. Convery, Hickson, Meyer, and Keidser (2018) assessed HLSM in a group of 62 older adults using the Partners in Health scale and the Cue and Response interview, a complementary pair of validated tools that assess self-management holistically (Battersby, Ask, Reece, Markwick, & Collins, 2003) and which have been modified for use with adults with hearing loss (Convery, Keidser, Hickson, & Meyer, 2016; Convery, Meyer, Keidser, & Hickson, 2018). A comparison of the factor structure of the original and modified assessment tools revealed a number of common self-management domains, including knowing about one's condition, knowing about treatment options and management strategies, and managing the social and emotional effects of the condition on everyday life. While there were specific aspects of self-management that appeared less relevant to hearing loss than to other

chronic conditions, such as maintaining healthy dietary and exercise habits, the findings suggest that chronic condition self-management likely has broad conceptual applicability to adult hearing rehabilitation.

Self-management may be considered clinically useful to the extent that it can be linked with treatment outcomes. The implementation of programs to foster self-management skills has been shown in many studies to yield better client outcomes, including improvements in physical disease measures such as glycaemic control and blood pressure (Chodosh et al., 2005; Norris, Engelgau, & Narayan, 2001); improved self-efficacy for managing the day-to-day demands of a chronic condition (Brody et al., 1999; Lorig et al., 2001; R. H. Osborne, Wilson, Lorig, & McColl, 2007); less self-reported health distress (Brody et al., 1999; Harvey et al., 2008; R. H. Osborne et al., 2007); greater feelings of empowerment, hopefulness, and motivation (Harvey et al., 2008; Lawn et al., 2007); and better self-reported general health (Harvey et al., 2008; Ory et al., 2013). However, the vast majority of self-management research has been conducted in primary care settings with people who have diabetes, arthritis, asthma, mental illness, and chronic respiratory and cardiovascular diseases. Despite the fact that hearing loss is an acknowledged chronic condition (World Health Organization, 2002), the relationship between self-management and client outcomes in the context of adult hearing rehabilitation has not been well-established.

Hearing aids are the most common form of rehabilitation provided to adults with hearing loss. In ICF terms, hearing aids address impairments of body function by increasing audibility and restoring at least partial access to acoustic cues (Hickson & Scarinci, 2007; Meyer, Grenness, Scarinci, & Hickson, 2016). Commonly used measures of hearing aid performance, such as speech discrimination and sound localisation testing, also evaluate hearing aid outcomes at the impairment level of the ICF (Granberg, Dahlström, Möller, Kähäri, & Danermark, 2014; Granberg, Möller, Skagerstrand, Möller, & Danermark, 2014). Previous research has established that for clients with mild to moderately severe hearing loss, the use of hearing aids can also lead to a reduction in activity limitations and participation restrictions, with greater social participation, improved psychological wellbeing, better interpersonal relationships, and reduced anxiety and depression as reported outcomes (Chisolm et al., 2007; McArdle, Chisolm, Abrams, Wilson, & Doyle, 2005; Vuorialho, Karinen, & Sorri, 2006). Further, it is the activity limitations and participation restrictions arising from hearing loss, rather than an awareness of impaired

body functions, that are among the primary motivators for adults to seek help for their hearing loss (Carson, 2005; Duijvestijn et al., 2003; Meyer, Hickson, Lovelock, Lampert, & Khan, 2014) and to take up hearing aids (Helvik, Wennberg, Jacobsen, & Hallberg, 2008; Knudsen, Öberg, Nielsen, Naylor, & Kramer, 2010; Laplante-Lévesque, Hickson, & Worrall, 2010). Together, these findings underscore the importance of selecting outcome measures that not only assess the impact of hearing aids on impairments of body function, but also their effect on activity limitations and participation restrictions.

Benefit and satisfaction are two frequently measured outcome domains that can be categorised within the activities and participation levels of the ICF (Granberg, Dahlström, et al., 2014; Granberg, Möller, et al., 2014). Hearing aid benefit is a subjective construct that reflects a person's perception of hearing aid performance in different listening situations (Humes, 2003; Turner, Humes, Bentler, & Cox, 1996). Hearing aid satisfaction has been defined as an emotional response that arises from a comparison between one's expectations and experience of using hearing aids (Wong, Hickson, & McPherson, 2009). Although closely related to benefit, satisfaction is thought to be informed not only by hearing aid performance, but also by the hearing aid's physical appearance; its cost; the frequency and nature of problems encountered while using the hearing aid, such as loudness discomfort and acoustic feedback; the quality of the professional service through which the hearing aid was obtained; and the extent of residual communication difficulty (Cox & Alexander, 1999; Wong, Hickson, & McPherson, 2003; Wong et al., 2009). The aim of this study was therefore to investigate, in a group of experienced bilateral hearing aid users, the relationship between self-reported HLSM (a personal factor) and hearing aid benefit and satisfaction (activities and participation outcomes).

5.3 Methods

5.3.1 Participants

Sample size determination was based on the hypothesis that HLSM would be an important parameter to assess clinically if it explained, at a minimum, 20% of the variance in self-reported hearing aid benefit and satisfaction (Lenth, 2001). For correlation analysis, 36 participants were required to detect an R^2 of 0.2 (a correlation coefficient of 0.45) with 80% power at an alpha level of 0.05. Thirty-seven participants took part in the study, all of whom were recruited from a database of research volunteers maintained by the National

Acoustic Laboratories (Sydney, Australia). The inclusion criteria were: (1) aged between 50 and 85 years; (2) a four-frequency average (4FA; average of pure-tone thresholds at 0.5, 1, 2, and 4 kHz) between 25 and 65 dB HL in both ears; and (3) user of bilateral hearing aids for ≥1 year. The exclusion criteria were: (1) presence of active ear disease; (2) non-English speaking; and (3) additional disabilities (e.g. dementia) diagnosed by a physician that would preclude participation in the present research study.

An overview of participant data is shown in Table 5-1. Of the 37 participants, 25 were male and 12 were female. Participants ranged in age from 52 to 83 years, with a mean age of 74 years (SD = 8.3). The mean PTA4 across the participant group was 49 dB HL (SD = 9.9). Participants had worn bilateral hearing aids for an average of 12 years (SD = 7.8). All participants wore behind-the-ear hearing aids. All participants reported that they wore their hearing aids ≥ 4 hours per day; 24 participants reported that they wore their hearing aids for ≥ 8 hours per day.

Table 5-1. An overview of participant data (N = 37)

Variable	Mean	Standard deviation	Range
Age (years)	74.2	8.3	52-83
Average PTA4 (dB HL)	48.8	9.9	25-65
Hearing aid experience (years)	12.1	7.8	3-35
Gender (% female/male)	68/32	*NA*	*NA*
HLSM *Actions* (factor score)	0.40	0.50	-1.05-1.02
HLSM *Psychosocial Behaviours* (factor score)	-0.13	0.83	-2.16-1.61
HLSM *Knowledge* (factor score)	-0.38	0.72	-1.57-0.97
APHAB Ease of Communication (rating)	21.7	14.3	1.0-66.3
APHAB Background Noise (rating)	40.1	17.3	1.0-84.7
APHAB Reverberation (rating)	38.0	15.9	6.8-66.5
APHAB Aversiveness (rating)	30.1	20.7	1.0-69.0
SADL Positive Effect (rating)	5.4	0.8	4.2-6.8
SADL Negative Features (rating)	4.6	1.03	2.7-6.3
SADL Personal Image (rating)	5.9	1.02	3.3-7.0

Note. Means, standard deviations, and ranges are shown for each variable, with the exception of the dichotomous categorical variable gender, for which the ratio of female to male participants is shown. APHAB scores can range from 1-99; higher scores reflect greater aided listening difficulty (i.e. less benefit). SADL scores can range from 1-7; higher scores reflect greater satisfaction.

5.3.2 Materials

5.3.2.1 Hearing loss self-management

HLSM was assessed with modified versions of the Partners in Health scale and the Cue and Response interview (Battersby et al., 2003; Convery, Meyer, et al., 2018; Smith, Harvey, Lawn, Harris, & Battersby, 2017), which were adapted with permission for audiology use. Both tools are part of the Flinders Chronic Condition Management Program™, a semi-structured assessment, planning, and motivational process for adults with chronic conditions (Battersby, 2005). Audiology versions of the Partners in Health scale and the Cue and Response interview were developed because the vocabulary used in the original tools was more medical in nature (e.g. symptoms, medication) than would typically apply in an audiological context (Convery et al., 2016).

The audiology version of the Partners in Health scale is a 10-item questionnaire in which participants are asked to rate the extent to which they feel they self-manage their hearing loss on a scale of 0 (*very little/never/not very well*) to 8 (*a lot/always/very well*). Higher ratings reflect better perceived self-management. Following the completion of the Partners in Health scale, the Cue and Response interview is administered by the clinician. Open-ended questions are used to explore the participant's understanding and knowledge of each item on the Partners in Health scale. For example, item 4 on the Partners in Health scale is: *I share in decisions made about my hearing with my hearing health professional*. The corresponding cue questions include: *How involved do you feel in making decisions about your hearing with your hearing health professional? Does your hearing health professional listen to you? Who else makes hearing health decisions with or for you?* After each item has been discussed, the clinician rates the participant's HLSM on a scale of 0 to 8. Participant and clinician perspectives are then compared. In cases where the participant and clinician ratings differ by ≥3, the item is discussed further and both the participant and clinician have the opportunity to adjust their ratings. In the end, a single client-clinician negotiated score is agreed upon for each item.

Exploratory factor analysis has found that together, the audiology versions of the Partners in Health scale and the Cue and Response interview tap into three domains of HLSM: (1) *Knowledge* (items 1 and 2), which includes knowing about hearing loss and its effects and knowing about appropriate treatment and management options; (2) *Actions* (items 3-8), which includes attending appointments, adhering to recommended treatments and management strategies, actively sharing in decision-making with hearing health care (HHC) professionals, accessing the necessary services and resources, monitoring for changes in hearing and functional status, and taking action to address those changes; and (3) *Psychosocial Behaviours* (items 9 and 10), which includes managing the effect of the hearing loss on emotional wellbeing and social participation (Convery, Hickson, et al., 2018). The audiology versions of the Partners in Health scale and the Cue and Response interview are shown in Table 3-1. For the purpose of the present study, scores for the *Knowledge*, *Actions*, and *Psychosocial Behaviours* domains of HLSM were calculated for each participant. This was done for each domain by first weighting the participant's ratings on each item of the HLSM assessment with the factor score coefficients reported in Convery, Hickson, et al. (2018), then summing the weighted ratings. Higher scores in the *Knowledge* domain indicate poorer HLSM, while higher scores in the *Actions* and *Psychosocial Behaviours* domains indicate better HLSM.

5.3.2.2 Hearing aid benefit

Aided hearing aid benefit was assessed with the Abbreviated Profile of Hearing Aid Benefit (APHAB; Cox & Alexander, 1995). The APHAB was chosen because it yields information about perceived hearing aid benefit across multiple dimensions (ease of speech understanding, listening comfort) in different acoustic environments, it was validated on a population that closely resembles participants in the present study (older adults who are experienced hearing aid users), and it is easy for individuals with a range of literacy levels to understand and complete. The APHAB is a 24-item self-report inventory in which participants use a seven-point scale (*always* to *never*) to rate the degree of difficulty they experience in everyday listening situations while wearing their hearing aids. Higher ratings represent greater perceived listening difficulty. The APHAB is composed of four subscales, each of which has six items: Ease of Communication, Background Noise, Reverberation, and Aversiveness. In the original validation of the APHAB, internal consistency was high for the unaided scores on each subscale (Cronbach's alpha = 0.84-0.85) and measures of test-retest reliability suggested that there was no systematic tendency for APHAB scores to change over time (Cox & Alexander, 1995).

5.3.2.3 Hearing aid satisfaction

Hearing aid satisfaction was assessed with the Satisfaction with Amplification in Daily Life (SADL) scale (Cox & Alexander, 1999). The SADL was chosen because it assesses dimensions of satisfaction that are hypothesised to be relevant to HLSM, such as the effect of hearing aids on self-image and the cost-benefit tradeoff of managing and wearing hearing aids; it was validated on a population that closely resembles participants in the present study; and it is sensitive to small changes in perceived satisfaction. Participants are asked to rate the degree of satisfaction they feel they receive from their hearing aids on a seven-point scale (*not at all* to *tremendously*). Higher ratings represent greater perceived satisfaction. The SADL has 15 items and is composed of four subscales, each of which represents a different domain of satisfaction: Positive Effect (six items), Service and Cost (three items), Negative Features (three items), and Personal Image (three items). In the initial report on the SADL's development, Cronbach's alpha was 0.85 for the global score (average of all subscales), indicating good internal consistency. Test-retest reliability, based on repeated measures conducted an average of 23 weeks apart, was high. Upon retest, 71% of the respondents scored within half a point of their original score

(Cox & Alexander, 1999). Further validation of the SADL, conducted with a sample of 196 adult participants from 13 audiology clinics, confirmed both the construct and internal validity of the scale (Cox & Alexander, 2001).

The Service and Cost subscale was not used in the present study due to the fact that some participants had paid privately for their hearing aids, while others had received fully subsidised hearing aids as part of a government program. Since the Service and Cost subscale contains the item *Does the cost of your hearing aid seem reasonable to you?*, there was concern that responses to this item would be skewed according to variations in funding source and would thus influence the overall score on this subscale. The instructions for administration on the developers' website (http://www.harlmemphis.org) indicate that eliminating the Service and Cost subscale is an acceptable way of utilising the SADL, particularly when subscale scores will be analysed individually.

5.3.2.4 Demographic and audiometric data

Information about gender, age, and length of hearing aid use was gathered with a purposefully developed self-report questionnaire. Participants underwent masked pure-tone air- and bone-conduction audiometry using ER-3A insert earphones and an Interacoustics AC40 clinical audiometer. Thresholds were measured according to the modified Hughson-Westlake procedure (Carhart & Jerger, 1959).

5.3.3 Procedure

Twenty-two participants completed all measures in one appointment of approximately 1-1.5 hours. The remaining 15 participants completed the HLSM assessment, demographic questionnaire, and audiometric assessment at one appointment and the hearing aid benefit and satisfaction measures at a second appointment approximately 2 weeks later. The procedural differences were due to the fact that the latter group was assessed as part of an unrelated study prior to commencing a hearing aid field trial.

The study was approved by and conducted under the ethical oversight of the Australian Hearing Human Research Ethics Committee (AHHREC2016-4; 2016-10; 2018-1) and the University of Queensland Medical Research Ethics Committee (2016000447; 2018000031) and conformed in all respects to the Australian government's National

Statement on Ethical Conduct in Human Research (National Health and Medical Research Council, 2007). Participants were compensated for their travel expenses.

5.3.4 Statistical analysis

APHAB and SADL subscale scores were analysed separately to tease out the extent to which HLSM could relate to different dimensions of hearing aid benefit and satisfaction. All statistical analyses were performed with IBM SPSS Statistics version 25. Skewness and kurtosis z-scores were calculated for each variable to assess normality of distribution. Four variables were not normally distributed. Years of hearing aid experience and the APHAB Ease of Communication score were positively skewed and were thus transformed using a square root transformation. Age and the SADL Personal Image score were negatively skewed and were thus transformed using a reflect and square root transformation (J. W. Osborne, 2002). Following transformation, the data met the necessary assumptions for performing Pearson's product-moment correlation analysis, namely linearity, a lack of influential outliers, and bivariate normality (Myers, Well, & Lorch, 2010). For each significant correlation, the coefficient of determination (R^2) was calculated by squaring the correlation coefficient. The coefficient of determination reflects the proportion of variance in one variable that is statistically (not causally) explained by the other variable (Myers et al., 2010).

5.4 Results

The relationship between the demographic variables (age, gender, and years of hearing aid experience) and the individual HLSM domain scores was investigated due to previous evidence of significant associations between these variables (Convery, Hickson, et al., 2018). As shown in Table 5-2, the results of the correlation analysis for the present dataset revealed a significant correlation between age and HLSM Knowledge, with older age associated with a higher score (i.e. poorer HLSM) in this domain ($r_{35} = 0.48$, $p = 0.003$). No other correlations between the demographic variables and the HLSM scores were significant.

Table 5-2. Correlation matrix showing correlation coefficients for the study variables

	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Age	1.00												
2. HA Experience	.24	1.00											
3. Gender	-.19	-.03	1.00										
4. HLSM *Actions*	-.12	.07	.21	1.00									
5. HLSM *Psychosocial Behaviours*	-.13	.06	-.13	-.19	1.00								
6. HLSM *Knowledge*	.48**	-.32	-.18	-.33*	-.24	1.00							
7. APHAB Ease of Communication	.09	.06	.09	.26	-.26	-.03	1.00						
8. APHAB Background Noise	.12	-.06	.13	.19	-.50**	.11	.72**	1.00					
9. APHAB Reverberation	.18	.04	.27	.11	-.51**	.10	.58**	.61**	1.00				
10. APHAB Aversiveness	-.01	-.07	.15	.00	-.03	-.13	.09	.29	.05	1.00			
11. SADL Positive Effects	-.01	.17	.32	.43**	.05	-.17	.00	-.02	.17	.17	1.00		
12. SADL Negative Features	.09	-.02	-.09	.04	.08	.07	-.50**	-.38*	-.46**	.04	.26	1.00	
13. SADL Personal Image	-.03	.09	.07	.04	.46**	-.21	-.46**	-.56**	-.59**	-.08	.29	.48**	1.00

Note. The shaded area highlights the correlations between the HLSM variables and the hearing aid benefit and satisfaction outcome measures. Marked correlations are significant at the 0.05 (*) or 0.01 (**) level (two-tailed). The variable APHAB Ease of Communication has been transformed using a square root transformation. The variables Age and SADL Personal Image have been transformed using a reflect and square root transformation. The variables HA Experience and APHAB Ease of Communication have been transformed using a square root transformation.

Figure 5-1 shows scatterplots for all significant correlations. The HLSM *Actions* factor score was moderately positively correlated with the SADL Positive Effect score (r_{35} = 0.43, p = 0.008). Better HLSM in the *Actions* domain was associated with greater self-reported satisfaction with the extent to which hearing aids improve speech understanding, reduce the need for repetition, and produce a natural sound quality. The coefficient of determination was R^2 = 0.18, indicating that HLSM in this domain statistically explained 18% of the variance in the SADL Positive Effect score.

The HLSM *Psychosocial Behaviours* factor score was moderately negatively correlated with the APHAB Background Noise (r_{35} = -0.50, p = 0.002) and APHAB Reverberation scores (r_{35} = -0.51, p = 0.001). Better HLSM in the *Psychosocial Behaviours* domain was associated with less self-reported aided listening difficulty in acoustic environments where there is background noise or reverberation. The coefficients of determination were R^2 = 0.25 and R^2 = 0.26, respectively, indicating that HLSM in this domain statistically explained 25% of the variance in the APHAB Background Noise score and 26% of the variance in the APHAB Reverberation score.

The HLSM *Psychosocial Behaviours* factor score was moderately positively correlated with the SADL Personal Image score (r_{35} = 0.46, p = 0.004). Better HLSM in the *Psychosocial Behaviours* domain was associated with greater self-reported satisfaction with hearing aid appearance and the extent to which participants believe that others perceive them as less capable because of their hearing aids. The coefficient of determination was R^2 = 0.21, indicating that HLSM in this domain statistically explained 21% of the variance in the SADL Personal Image score.

The HLSM *Knowledge* factor score was not significantly correlated with any of the APHAB (r_{35} = -0.03 – -0.13, *ps* > 0.05) or SADL (r_{35} = -0.17 – -0.21, *ps* > 0.05) subscale scores.

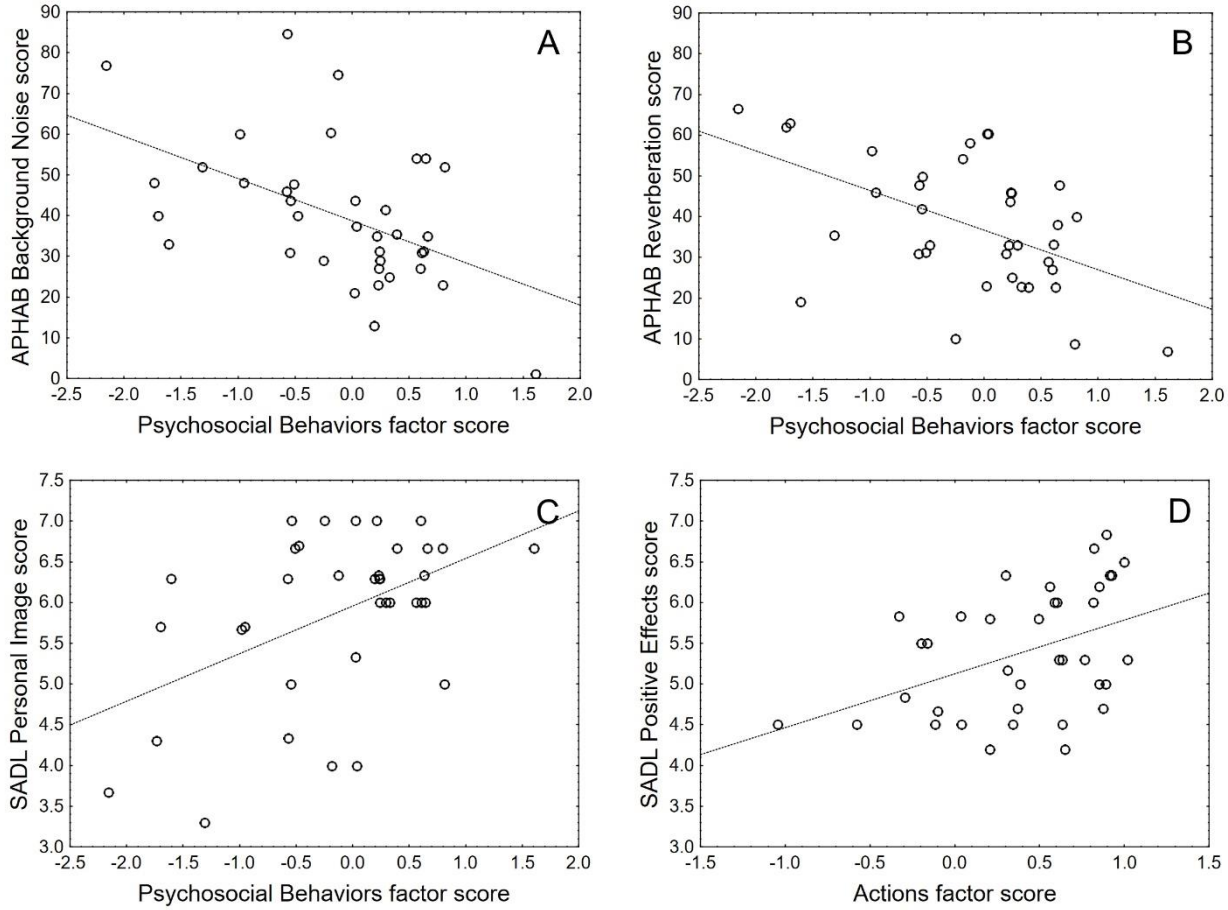

Figure 5-1. Scatterplots showing the significant relationships between: (A) the APHAB Background Noise subscale score and the *Psychosocial Behaviours* factor score; (B) the APHAB Reverberation subscale score and the *Psychosocial Behaviours* factor score; (C) the SADL Personal Image subscale score and the *Psychosocial Behaviours* factor score; and (D) the SADL Positive Effects subscale score and the *Actions* factor score

5.5 Discussion

The intrinsic characteristics of a person – termed personal factors by the ICF – are an acknowledged contributor to the individual experience of health and disability (Geyh et al., 2011; World Health Organization, 2001). The present study supports this assertion with three key findings: (1) that participants who reported better self-management in the *Psychosocial Behaviours* domain were more likely to report less aided listening difficulty in noisy and reverberant environments; (2) that participants who reported better self-management in the *Psychosocial Behaviours* domain were more likely to report greater satisfaction with the physical appearance of their hearing aids; and (3) that participants who reported better self-management in the *Actions* domain were more likely to report greater satisfaction with the sound quality and performance of their hearing aids.

Our finding that participants who reported better self-management in the *Psychosocial Behaviours* domain were more likely to report less aided listening difficulty in noisy and reverberant environments is sensible given that successful self-management of the psychosocial effects of a chronic condition involves the adoption of a range of coping strategies to mitigate these effects on daily functioning (Clark et al., 1991; Lorig & Holman, 2003). For people with hearing loss, this may include disclosing their hearing loss to a new conversational partner to ensure their communication needs are met, taking the initiative to request repetition or clarification during a conversation, moving closer to a talker of interest, and employing speechreading tactics (Preminger, 2007). Among people who wear hearing aids, communication strategies can augment the benefit received from amplification, particularly in noisy and reverberant environments, in which hearing aids do not perform as well as they do in quiet environments with a single talker (Dillon, 2012). It is equally possible, however, that participants who have less listening difficulty in noisy and reverberant environments experience fewer psychosocial impacts and thus report better self-management in this domain.

Participants who reported better self-management in the *Psychosocial Behaviours* domain were also more likely to report greater satisfaction on the Personal Image subscale of the SADL, which asks whether respondents believe other people notice their hearing loss more when they wear hearing aids, how content they are with the appearance of their hearing aids, and whether they believe wearing hearing aids makes them seem less capable (Cox & Alexander, 1999). In addition to the communicative coping strategies discussed above, a further component of psychosocial self-management entails confronting and coming to terms with the stigma associated with having a chronic condition (Kralik, Koch, Price, & Howard, 2004; Lorig & Holman, 2003). Hearing loss and the use of hearing aids are often perceived as stigmatising because they are associated with aging, a loss of capability, and an alteration of one's identity (Wallhagen, 2010). Among our study participants, those who are coming to terms with the stigma attached to having a hearing loss and wearing hearing aids – that is, those who report better self-management of the emotional impacts of their hearing loss – may also be less bothered by the physical appearance of their hearing aids or others' perception of their capabilities.

Our finding that the *Psychosocial Behaviours* domain of HLSM was most strongly associated with hearing aid outcomes relative to the other HLSM domains supports previous research suggesting that the psychosocial aspects of hearing loss need to

receive greater consideration in clinical assessment and management planning. In a recent study by Convery, Meyer, et al. (2018), 30 older adults – including 15 participants in the present study – completed an assessment of their HLSM using the Partners in Health scale and the Cue and Response interview. The findings suggested that the psychosocial issues arising from hearing loss remain a mostly unaddressed component of their rehabilitation, despite the fact that all participants in that study were current recipients of HHC. Studies in which audiologist-client interactions have been directly observed confirm that audiologists tend to take a biomedical, rather than biopsychosocial, approach to client care (Grenness, Hickson, Laplante-Lévesque, & Meyer, 2014; Grenness, Hickson, Laplante-Lévesque, Meyer, & Davidson, 2015; Meyer, Barr, Khan, & Hickson, 2017). It has also been suggested that prioritising the biomedical aspects of hearing loss may have negative consequences for uptake and adherence to hearing rehabilitation (Ekberg, Grenness, & Hickson, 2014). In a further analysis of the Grenness et al. (2015) data, Ekberg et al. (2014) found that when the client's psychosocial concerns were left unaddressed by the audiologist, the client was more likely either to decline hearing aids outright, or to go ahead with a hearing aid fitting but express less commitment to their long-term use.

Participants who reported better self-management in the *Actions* domain were more likely to report greater satisfaction with the sound quality and performance of their hearing aids. The *Actions* domain encompasses treatment adherence, participation in shared decision-making, access to services and resources, appointment attendance, monitoring for changes in hearing and functional status, and taking action to address those changes. The link between *Actions* and satisfaction is a sensible one since it is likely that individuals who actively participate in their hearing rehabilitation and follow up with their HHC professional to address any difficulties they encounter are more likely to achieve satisfaction with their hearing aids. Two components of the *Actions* domain, treatment adherence and participation in shared decision-making, have also been investigated in previous audiology and chronic condition research. First, numerous studies have demonstrated that people who report greater daily hearing aid usage (i.e. better adherence to treatment) also report greater satisfaction with their hearing aids. For example, Uriarte, Denzin, Dunstan, Sellars, and Hickson (2005) used the SADL to investigate hearing aid satisfaction 3-6 months post-fitting in a sample of 1,014 adults. Longer daily hearing aid usage was associated with greater hearing aid satisfaction on all of the SADL subscales. In a systematic review conducted by (Wong et al., 2003), the majority of studies reviewed also reported a

significant positive association between hours of daily usage and hearing aid satisfaction, even when different measures of satisfaction were used. In the chronic condition literature more generally, there is evidence of a positive relationship between treatment adherence and satisfaction, although it is unclear whether greater adherence leads to greater satisfaction, or whether clients who are more satisfied with their treatment are more likely to adhere to it (Barbosa, Balp, Kulich, Germain, & Rofail, 2012; Dimatteo, Giordani, Lepper, & Croghan, 2002). Second, a systematic review of the broader health literature has additionally demonstrated that shared decision-making results in better treatment satisfaction, particularly in the context of chronic conditions and long-term interventions (Joosten et al., 2008).

The *Knowledge* domain of HLSM – which includes knowing about one's hearing loss and its recommended management strategies – was not significantly associated with either hearing aid benefit or satisfaction in the present study. While knowledge is an important part of HLSM, its lack of an independent relationship with benefit and satisfaction suggests that knowledge alone is insufficient to lead to good outcomes, a finding that is supported by the existing chronic condition literature (Bodenheimer, 2003). This finding also highlights the need for emphasising psychosocial, rather than informational, counseling, the latter of which tends to be the focus in current clinical practice.

5.5.1 Study limitations

Caution should be exercised in generalising the results of the present study to a wider clinical population. All parameters were assessed with self-report measures, which do not necessarily yield a true or complete picture of experiences in the real world. In particular, the HLSM measures used in this study reflect the respondents' subjective assessment of how well they believe they self-manage, rather than capture the actual means by which the respondents self-manage day-to-day or how successful they are at doing so. Relatedly, it is possible that participants who are predisposed to give a high (or low) rating on one measure will give an equivalent rating on another measure, meaning that some of the significant associations found in this study may simply be statistical artifacts. All assessments were performed at a single point in time, meaning that a definitive statement cannot be made about the direction of the relationship between HLSM and hearing aid benefit and satisfaction. While it is possible that individuals who obtain greater benefit and satisfaction from their hearing aids do so because they are better self-managers, it is

equally possible that benefit and satisfaction inform individuals' perception of how well they believe they self-manage. It is also possible that a separate variable, not measured in the present study, may explain some of the significant correlations.

A further limitation of the present study is the choice of benefit and satisfaction as outcome measures. Benefit and satisfaction in the context of hearing aid use are not well-defined (Humes, 2001), as illustrated by the significant moderate correlations we observed in our sample between three of the APHAB subscales (Ease of Communication, Background Noise, and Reverberation) and two of the SADL subscales (Negative Features and Personal Image) (Table 5-2). While future work exploring the association between HLSM and hearing rehabilitation outcomes depends to some extent on the development and validation of more precise measures of hearing aid benefit and satisfaction, consideration could be given to the use of pre- and post-intervention assessments of HLSM to measure outcomes, or existing measures that tap into broader dimensions of living with a hearing loss, such as HRQoL (Abrams, Chisolm, & McArdle, 2005). More objective measures of hearing aid usage, such as datalogging, could also contribute to increasing our understanding of the relationship between the adherence component of HLSM and hearing rehabilitation outcomes.

Statistical corrections to adjust for multiple comparisons were not applied during the analysis. We acknowledge that the large number of correlations means there is a high likelihood some will be significant by chance. However, the present study was intended to be exploratory, with the goal of identifying which, if any, relationships between the individual domains of HLSM and different dimensions of hearing aid benefit and satisfaction are worthy candidates for more thorough investigation in future. As such, we did not wish to risk increasing the possibility of Type II errors (false negatives) by overcorrecting for Type I errors (false positives). We do note, however, that if a Bonferroni correction is applied to the set of seven correlations performed for each HLSM factor score, all correlations remain significant except the correlation between the Actions factor score and the SADL Positive Effect score, whose *p* value drops to 0.056. By applying this correction, the statistical power is reduced, although given the relative robustness of the uncorrected *p* values, it is possible that with a larger N, the correlation between the Actions factor score and the SADL Positive Effect score would return to significance.

5.5.2 Future directions

Our finding that HLSM statistically accounted for 18-26% of the variance in particular aspects of hearing aid benefit and satisfaction suggests that HLSM is one of the important components of hearing rehabilitation. Consideration of a client's personal factors – such as their individual self-management strengths and weaknesses – is considered a key facilitator of client-centred care (Geyh et al., 2011), a paradigm in which health care is provided in a "holistic, individualised, respectful, and empowering" manner (Morgan & Yoder, 2012). The particular importance of the psychosocial aspects of HLSM highlights the need for non-technological hearing rehabilitation interventions that directly target this area. Future work should therefore focus on the development and validation of a HLSM framework for clinical practice, with the aim of determining whether tailored interventions targeting individually assessed self-management needs will positively affect hearing rehabilitation outcomes. Prospective studies, in which HLSM is assessed at the initiation of a rehabilitation intervention and again at subsequent time points, would assist in achieving this goal.

5.6 Conclusion

The findings of this study highlight both the importance of HLSM for client outcomes and the potential for using information about a patient's HLSM in different domains as part of clinical decision-making and management planning.

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Chapter 6. Audiologists' perceptions of hearing loss self-management support with adult clients

The previous three chapters examined hearing loss self-management (HLSM) from the perspectives of older adults with hearing loss. Together, they presented evidence that HLSM is a multidimensional construct that can be assessed with modified clinical tools and is significantly associated with hearing aid benefit and satisfaction. This chapter investigates the complementary concepts of HLSM and HLSM support from the perspective of the clinician, with the aim of exploring audiologists' understanding of these concepts and determining to what extent HLSM support strategies are used in current clinical practice. The data presented in this chapter data will be pooled with planned post-doctoral work and prepared for submission to a peer-reviewed journal.

6.1 Introduction

Self-management refers to the knowledge and skills used to manage the effects of a chronic condition on all aspects of daily life (Barlow, Wright, Sheasby, Turner, & Hainsworth, 2002; Convery, Hickson, Keidser, & Meyer, 2019; Lorig & Holman, 2003). The chronic condition literature conceptualises self-management as a multidimensional construct (Barlow et al., 2002; World Health Organization, 2002). Recent research suggests that the same is likely to hold true in an audiological context, with findings that HLSM encompasses three broad domains: (1) *Knowledge* (knowing about hearing loss and one's rehabilitation options); (2) *Actions* (adhering to treatment, participating in shared decision-making, accessing services and resources, monitoring for changes in hearing and functional status, and taking action to address those changes); and (3) *Psychosocial Behaviours* (managing the effects of hearing loss on one's social life and emotional wellbeing) (Convery, Hickson, Meyer, & Keidser, 2018). Further studies have demonstrated that HLSM can be successfully assessed with a modified version of a validated generic self-management assessment tool (Convery, Meyer, Keidser, & Hickson, 2018) and that there is a relationship between HLSM and hearing aid benefit and satisfaction (Convery, Keidser, Hickson, & Meyer, 2019), suggesting that HLSM is clinically relevant for older adults.

The provision of clinical care to ensure the acquisition of self-management knowledge and skills is referred to as self-management support (Lawn & Schoo, 2010; Lorig & Holman,

2003). According to Lawn and Schoo (2010), effective self-management support has three main components: (1) ongoing individualised assessment; (2) collaborative goal-setting; and (3) skill development. Structured self-management support programs have been shown to yield improved health outcomes for patients with diabetes, hypertension, mental illness, and arthritis, including improvements in objective disease measures, such as glycaemic control and blood pressure (Chodosh et al., 2005; Norris, Engelgau, & Narayan, 2001); less self-reported health distress (Osborne, Wilson, Lorig, & McColl, 2007); better self-reported general health (Harvey et al., 2008); less self-reported pain and fatigue (Foster, Taylor, Eldridge, Ramsay, & Griffiths, 2007; Franek, 2013); and greater feelings of empowerment and motivation (Lawn et al., 2007). Investigations into aural rehabilitation and communication programs that include a self-management support component have reported similar outcomes, including improved psychosocial wellbeing (Hickson, Worrall, & Scarinci, 2007; Thorén, Öberg, Wänström, Andersson, & Lunner, 2014), greater knowledge of hearing loss and hearing aids (Ferguson, Brandreth, Brassington, Leighton, & Wharrad, 2016; Hawkins, 2005), reduced perception of activity limitations and participation restrictions (Chisolm & Arnold, 2012; Hawkins, 2005), and better quality of life (Kramer, Allessie, Dondorp, Zekveld, & Kapteyn, 2005).

Despite promising research findings, self-management support programs are not widespread in routine clinical practice, either in audiology or in health care more generally. This may have arisen for several reasons. First, the standards of care described in clinical practice guidelines may not reflect the latest self-management research. Barker, de Lusignan, Baguley, and Gagné (2014) undertook a content analysis of British health policy documents outlining standards of care for hearing loss and a group of other chronic conditions with the aim of determining how well they conformed to the Chronic Care Model (CCM). The CCM is an organisational framework that describes best-practice clinical care at the client, clinician, and organisational levels (Wagner et al., 2001). While no standard fully exemplified the CCM, the audiological policies mapped especially poorly onto the model's framework, with particular deficiencies observed in the self-management support component. Second, clinical practice guidelines may not be adhered to even when they clearly and explicitly recommend self-management support. For example, Roberts, Younis, Kidd, and Partridge (2013) report that in the United Kingdom, implementation of self-management support for individuals with asthma and chronic obstructive pulmonary disease is inconsistent despite its inclusion in national and international practice guidelines for practicing lung specialists. Third, self-management support programs may not yield the

same significant outcomes in a clinical setting as are achieved in a controlled research environment. Kennedy et al. (2013) reported on a large (N = 5,599), year-long randomised controlled trial of a self-management support program that was implemented in a primary care setting for people with diabetes, chronic obstructive pulmonary disease, or irritable bowel syndrome. Despite demonstrating significant positive effects in a research context, the trial showed no significant effect on patient outcomes, including self-efficacy for self-management behaviours, health-related quality of life, or psychosocial wellbeing, when the program was provided as part of clinical practice. The authors suggested that this discrepancy was primarily due to a lack of fidelity between the program's original design and the way it was implemented in clinical practice. In particular, the authors noted that the clinicians had limited time to devote to self-management support, meaning that they frequently adapted or shortened the program to suit their busy schedule; the clinicians' employers incentivised the achievement of improved biomedical outcomes, such as improved glycaemic control, rather than psychosocial and self-management outcomes; and the patients they served differed from the original research population in terms of socioeconomic status, ethnicity, and disease severity. Each of these reasons speaks to a fundamental disconnect between research goals and clinical realities.

Researchers have traditionally aimed to influence clinical practice by disseminating research findings through such channels as peer-reviewed literature and conference presentations. Boisvert et al. (2017) conducted a study that aimed to determine how audiologists rated the importance and reliability of the different sources of information they use to inform their clinical practices, particularly those related to decision-making and discussing rehabilitation options with clients. Of particular relevance to the process of knowledge translation was their finding that peer-reviewed literature and conference presentations were ranked as neither important nor reliable by the clinicians who participated in the study. To better address these factors, the authors proposed that audiology adopt an "integrated model of knowledge translation," which they define as an active collaboration between creators and consumers of research in which clinicians are integrated into all stages of the research, from conception to dissemination (Boisvert et al., 2017). The findings of Boisvert et al. (2017) support the idea that successful translation of a health innovation into routine clinical practice is a complex and multifaceted process that necessitates sustained and cooperative effort at the individual, organisational, and policy levels (Greenhalgh, Robert, MacFarlane, Bate, & Kyriakidou, 2004).

An in-depth review of how organisations and policymakers contribute to research translation is beyond the scope of this paper. However, a number of individual clinician factors that influence the adoption of clinical innovations have been reported in the literature. These include the extent to which clinicians understand the innovation, beliefs about the value of the innovation, the level of relevant education and training, motivation to adopt the innovation, self-efficacy for performing new clinical tasks, and perceptions of how well the innovation will integrate into existing clinical protocols (Jordan & Osborne, 2007; Lake & Staiger, 2010; Moodie et al., 2011; Roberts et al., 2013). One theoretical framework that has been developed to better understand these factors, as well as others that influence behaviour, is the COM-B model. The COM-B model conceptualises Behaviour as an interaction between three components: Capability (an individual's ability, whether psychological or physical, to perform the behaviour), Opportunity (the physical and social environment in which the behaviour is performed), and Motivation (an individual's desire or need to perform the behaviour) (Michie, van Stralen, & West, 2011). The COM-B model forms the core of the Behaviour Change Wheel, which can be used to design and evaluate interventions to bring about behavioural change (Michie, Atkins, & West, 2014). The first step in the Behaviour Change Wheel is to clearly define the target behaviour. In the context of HLSM, the findings of a Delphi review conducted in the United Kingdom indicate that HLSM support behaviours are not yet well-defined (Barker, Munro, & de Lusignan, 2015). For example, when participating audiologists were asked to identify clinical behaviours necessary to provide effective self-management support, their responses were broad and vaguely defined, such as "be professional" and "promote self-advocacy." Barker et al. (2015) suggested that defining these attributes in more concrete, behavioural terms, as recommended by the Behaviour Change Wheel (Michie et al., 2014), could facilitate uptake and enactment of these behaviours in routine clinical practice.

The current study was designed as a first step toward identifying and clarifying the clinical behaviours that constitute HLSM support and the context in which these behaviours are performed. The aims of this qualitative study were to: (1) explore clinical audiologists' perceptions of what adults do to self-manage a hearing loss; (2) explore their perceptions of what audiologists do to support HLSM; and (3) identify what audiologists believe is the highest priority to address in developing future HLSM support strategies.

6.2 Methods

6.2.1 Research design

Focus groups of clinical audiologists were used to collect the data. Focus groups were chosen as the method of data collection because they are often used in the early or exploratory stages of a research project to gain an understanding of the behaviours and beliefs of a particular group, particularly when these behaviours and beliefs are not well-defined (Gill, Stewart, Treasure, & Chadwick, 2008; Michie et al., 2011). Additionally, interactions between group members can give rise to synergistic ideas that would not be obtainable through a series of individual interviews (Kitzinger, 1994).

6.2.2 Participants and setting

Two focus groups were convened, both of which were held at the 23rd Audiology Australia National Conference in Sydney, Australia, on 22 May 2018. Participants were recruited through convenience sampling prior to and during the conference via Twitter, Facebook, emails to the clinical staff of three chains of audiology clinics, printed advertisements displayed in the exhibition hall of the conference, and word of mouth. The inclusion criteria were: (1) qualified audiologist; (2) currently working clinically in Australia with adult clients; and (3) at least two years of previous work experience, to increase the likelihood that they had developed their own beliefs about clinical practice.

A total of 11 audiologists took part in the focus groups (five in the first group and six in the second group). Eight participants were female and three were male. Participants ranged from 38 to 64 years (median age = 59 years). The gender distribution of the focus group participants reflected that of the members of Audiology Australia, the peak professional body representing the majority of practicing audiologists in Australia. However, the focus group participants skewed older than Audiology Australia members: approximately 75% of Audiology Australia members are under the age of 40. Seven of the focus group participants were employed in the private sector (four by national chains of audiology clinics; three by independent providers) and four were employed in the public sector. Participants reported a median of 30 years of experience as an audiologist (range = 13-41 years). Six audiologists worked full-time (>30 hours per week), four worked part-time, and one worked casually.

Treatment of participants was approved by the Australian Hearing Human Research Ethics Committee and the University of Queensland Medical Research Ethics Committee and conformed in all respects to the Australian government's National Statement on Ethical Conduct in Human Research (National Health and Medical Research Council, 2007). Participants were not compensated financially for their participation, but were advised that they could claim participation in the focus group as a continuing professional development activity with Audiology Australia.

6.2.3 Procedure

The focus groups were semi-structured and followed the topic guide shown in Table 6-1. The questions were piloted with a group of five research audiologists to ensure the questions were easily understood and elicited meaningful responses. The pilot participants were given the opportunity to suggest revisions to the wording of the questions; they did not believe any revisions were necessary.

Table 6-1. The topic guide used in the audiologist focus groups

1. What is your understanding of the term *hearing loss self-management*? What does it mean or involve for a person to self-manage his or her hearing loss?
2. Audiologists have a role in promoting and supporting the development of self-management skills in people with hearing loss. Which areas of hearing loss self-management do you think audiologists routinely address with their adult clients?
3. Which areas of hearing loss self-management do you think audiologists do not routinely address with their adult clients?
4. Of the areas of hearing loss self-management that are not routinely addressed, which three are the most important to you in terms of what you think audiologists should be doing?

The groups were facilitated by the first author (EC) and an assistant, both of whom are qualified audiologists. Each group ran for approximately 90 minutes and was audio- and video-recorded. As an icebreaker activity, focus group participants were asked by the facilitator to say their name, the audiology clinic at which they worked, and their favourite hobby. The icebreaker question was chosen because it can be answered quickly and factually, establishes what all participants have in common (they are all audiologists) but

identifies them as individuals who are permitted to express different views (they all have different favourite hobbies), and does not highlight power or status differences between the group members (Krueger & Casey, 2000).

As the participants identified and discussed examples of HLSM and HLSM support in response to the first three questions in the topic guide, their responses were noted briefly on Post-It notes by the facilitator and given to the assistant facilitator to group thematically on the wall, in full view of the participants. At the end of the discussion of each of these questions, any areas of HLSM that had not been spontaneously mentioned by the focus group participants but formed part of the HLSM theoretical framework were described briefly by the facilitator and the participants invited to comment.

The fourth question in the topic guide was addressed using the nominal group technique. The nominal group technique is an approach to the generation, discussion, and ranking of ideas that aims to reduce the effects of interpersonal and power dynamics within the group (Gallagher, Hares, Spencer, Bradshaw, & Webb, 1993). This technique was applied in the current study by asking the focus group participants to first examine the groups of Post-It notes on the wall that each represented a different aspect of HLSM. The participants were provided with three Post-It notes numbered with 1, 2, and 3, respectively. The facilitator then asked the participants to rank the three areas of HLSM they believed should be the top three priorities for audiologists to address by placing their numbered Post-It notes next to their chosen areas, with number 1 representing the highest of their three priorities and number 3 representing the lowest of their three priorities.

6.2.4 Data analysis

The audio recordings of the two focus groups were professionally transcribed and the transcriptions analysed using the framework method of thematic analysis. Thematic analysis is an approach to qualitative analysis that aims to identify both explicit and implicit ideas in a textual sample and to identify patterns of meaning (“themes”) within the data that are relevant to describing a particular phenomenon (Braun & Clarke, 2006). In the framework method, the data are organised into an analytical framework that structures the data in the context of the research question (Gale, Heath, Cameron, Rashid, & Redwood, 2013). The framework method allows for a hybrid approach to categorisation, whereby

codes are grouped both deductively, in the context of existing theory, and inductively, to allow new concepts to emerge from the data.

For the data collected in the current study, meaning units relevant to the study aims were identified. The meaning units were then coded descriptively and inductively by the first author (EC). Coding was checked by the second author (CM) and discrepancies discussed. Following a group discussion that involved all authors (EC, CM, LH, and GK), the codes were grouped into categories. For categorisation of the codes pertaining to HLSM, the three domains of HLSM identified in Convery, Hickson, et al. (2018) – *Knowledge*, *Actions*, and *Psychosocial Behaviours* – were used as an *a priori* theoretical framework. The individual components of each domain served as subcategories. Codes pertaining to HLSM support were categorised according to Lawn and Schoo's (2010) model of self-management support, which encompasses ongoing individualised assessment, collaborative goal-setting, and skill development. Categorisation for both HLSM and HLSM support allowed for emergent categories and subcategories as informed by the data.

Priority areas for future improvement were identified by examining the numbered Post-It notes that the focus group participants had placed next to the different components of HLSM. Three points were assigned to all Post-It notes bearing a 1 (highest priority), 2 points to those with a 2 (second-highest priority), and 1 point to those with a 3 (third-highest priority). Points were then summed for each HLSM component.

6.3 Results

6.3.1 What do people do to self-manage a hearing loss?

Table 6-2 provides an overview of the categories and subcategories identified for HLSM, along with a representative meaning unit for each subcategory. Additional meaning units are included in the following sections, in which findings for each category are reported. Three subcategories within the *Psychosocial Behaviours* category – acknowledge the hearing loss, accept the hearing loss, and take ownership of the hearing loss – represent new concepts that emerged from the focus group data.

Table 6-2. Categories and subcategories of HLSM, with a representative meaning unit shown for each subcategory

Category	Subcategory	Representative meaning unit
Knowledge	Understand hearing loss	"Certain information about your hearing loss could be really useful. Like, it's permanent; or, it could get worse; or, it's going to fluctuate; or, you've got a hole in your eardrum, don't get water in your ear."
	Understand hearing rehabilitation options	"They want to see if [hearing technology that can be purchased over-the-counter] works and make decisions based on experience, rather than what we as professionals are telling them from a knowledge perspective."
Actions	Access services and resources	"Before they take a step to do anything more about [their hearing loss], they might join a group like Better Hearing or SHHH."
	Share in decision-making	"Some [people with hearing loss] are self-reliant, they will go away with information [about hearing rehabilitation options], they will discuss it with their family and then come back and decide what they're going to do."
	Use and adhere to rehabilitation strategies	"So starting to use phones that either can increase the volume or TV streamers or any sort of technology that can assist, whether it's audio, kind of increasing the volume, or text."
	Monitor for changes and new problems	"It's actually amazing how long some people have worn hearing aids and that still becomes an issue. Or they don't know why their hearing aid whistles. Right, they've got a hole in the tubing or something like that and they have no concept."

Category	Subcategory	Representative meaning unit
Actions	Take action to address changes and new problems	"You can use the mobile phone to connect to your hearing aids and they can then connect to the audiologist…. They can anytime send a message, if they have a problem, we can do a fine-tuning and send it back to them."
Psychosocial Behaviours	Manage the effects of hearing loss on emotional wellbeing	"But if that's simply because when [people with hearing loss] go out, they get such negative feelings about things that they stop going out, that can't be held as being good. That's a potential problem for mental health issues and depression and lots of other things that we don't know much about."
	Manage the effects of hearing loss on social life	"[The hearing loss is] not going to change, so you're going to have to change, your lifestyle, social situation, all those things."
	Acknowledge the hearing loss	"But before you make a decision [about pursuing hearing rehabilitation], you've got to have enough awareness. What actually is going on with you?"
	Accept the hearing loss	"So then there has to be… an acceptance of what people have said to them [about their hearing loss], all of those steps you have to go through before you do anything and certainly go and see someone about it."
	Take ownership of the hearing loss	"[Self-managing a hearing loss involves] possibly getting over denial and realising that it's a long process to actually own your problem. And then gradually coming to some conclusion that you're the only one that can do anything about it."

Note: Subcategories shown in italics represent new concepts derived from the data that are not part of the theoretical framework for self-management that guided the study.

6.3.1.1 HLSM: Knowledge

None of the focus group participants made unprompted comments about clients' need to understand their hearing loss as a component of HLSM. When prompted by the facilitator to consider this aspect of HLSM, one participant in Group 2 expressed the belief that knowledge about the specific characteristics of one's hearing loss was useful insofar as it informed subsequent management strategies:

> *Certain information about your hearing loss could be really useful. Like, it's permanent; or, it could get worse; or, it's going to fluctuate; or, you've got a hole in your eardrum, don't get water in your ear.* (Audiologist employed in the public sector, 13 years of experience)

Many of the participants' comments about knowledge-seeking in this area were vague, referring to the need to be "educated" and to have "all the necessary information" in order to be considered a successful self-manager of one's hearing loss. However, no participant described what this information might include, or the specific behaviours or processes people might undertake to seek out such knowledge.

Participants in both focus groups stated, unprompted, that an understanding of hearing rehabilitation options and strategies was a key component of HLSM. They described knowledge-seeking in this area as a largely self-directed process that often occurs before professional hearing help is sought. A participant in Group 1 stated that people seek knowledge from multiple sources, including websites, family members, and peers, with the accumulated knowledge informing subsequent decisions about hearing rehabilitation:

> *Dr. Google, word of mouth…. If they're at a club with people of similar age, they might see someone else has already had their intervention and think, oh, maybe it is okay if I actually do that.* (Audiologist employed in the public sector, 38 years of experience)

A participant in Group 2 noted that knowledge about hearing rehabilitation is sometimes gained through direct experience, rather than through discussions with a hearing health care professional:

> *They want to see if [hearing technology that can be purchased over-the-counter] works and make decisions based on experience, rather than what we as professionals are telling them from a knowledge perspective.* (Audiologist employed by a private national chain, 14 years of experience)

Another participant in Group 2 stated that the process of knowledge-seeking continues after a person has sought professional hearing help and has taken up hearing rehabilitation, noting that the nature of the knowledge sought varies greatly from one client to another:

> *[Some clients] won't participate enough, they'll say, just tell me what I need to do…. Yet you'll have other people that tell me, I want to know what brand and model of chip are in any hearing aid and what its average failure rate is, or something… information you can't even source*. (Audiologist employed by a private independent clinic, 39 years of experience)

6.3.1.2 HLSM: Actions

Participants in both focus groups spontaneously identified several self-management behaviours that belonged to this subcategory, the first of which was accessing professional hearing health care. A participant in Group 1 noted that this was often done reluctantly or at the behest of a friend or family member:

> *Sometimes that [family member] will end up knocking sense into you. They will then say, you have to do something about it. Because usually when you've got a hearing loss, maybe you don't think it's a problem, but the people around you think you have a big problem. So those people around you are the ones who actually do something for you. Maybe they're just bringing you to see an audiologist or see an ENT.* (Audiologist employed in the public sector, 18 years of experience)

A participant in Group 2 noted that some people are beginning to seek hearing help from alternative service delivery models:

> *Well, talking about self-fitting hearing aids… that's becoming an option for them to explore what they want, and whether they're willing to try that sort of level of technology. Then you've got over-the-counter…. [People are] going out of their way to seek catalogue items, maybe, or some other hearing device.* (Audiologist employed by a private national chain, 14 years of experience)

Participants in both focus groups also identified peer support groups as a way in which some people self-manage their hearing loss. A participant in Group 1 noted that joining such groups can often occur prior to seeking professional hearing help:

> *Before they take a step to do anything more about [their hearing loss], they might join a group like Better Hearing or SHHH.* (Audiologist employed by a private national chain, 37 years of experience)

Participants in both focus groups spontaneously identified shared decision-making as a way in which people self-manage their hearing loss. They described the decision-making process as shared not only between the client and clinician, but also inclusive of the client's family members. A participant in Group 2 noted that the extent to which decision-making about hearing rehabilitation was shared was highly dependent upon the individual client's personality:

> *Some of them are self-reliant, they will go away with information [about hearing rehabilitation options], they will discuss it with their family and then come back and decide what they're going to do…. Some people say, no, just tell me what I need, [audiologist's name], and that's fine.* (Audiologist employed by a private national chain, 14 years of experience)

A second Group 2 participant noted that the clinical style of the audiologist was another factor that influenced whether or not the decision-making process was shared:

> *It depends on the person who's doing all of this. I know that some clinicians are very much, this is what you need, this is what you're getting, and no other options are available. Others are more inclusive in the decision-making, so it does depend on that quite a bit.* (Audiologist employed by a private national chain, 37 years of experience)

Participants in both groups spontaneously described a number of different ways in which people with hearing loss use and adhere to different hearing rehabilitation strategies. A participant in Group 1 noted the use of listening tactics and communication strategies, which they primarily described as management strategies people use prior to pursuing professional hearing help:

> *Prior to any professional advice, it would be about using tactics to help improve the listening condition in some way. It would be getting on one side of a person because they noticed a hearing loss in one ear. Perhaps being in line of sight of a person, reducing a bit of noise, that sort of, you know, kind of intuitive stuff.* (Audiologist employed in the public sector, 38 years of experience)

Another Group 1 participant identified the use of consumer technologies designed to improve communication as another HLSM behaviour, again as a precursor to seeking professional hearing help:

> *So starting to use phones that either can increase the volume or TV streamers or any sort of technology that can assist, whether it's audio, kind of increasing the*

> *volume, or text.* (Audiologist employed by a private national chain, 13 years of experience)

After professional hearing help has been sought, several participants in both groups expressed the belief that regular and ongoing hearing aid use was an essential component of HLSM:

> *If you are not wearing your hearing aids then are you doing something about your hearing loss? I mean, this is such a first step.* (Audiologist employed in the public sector, 18 years of experience)

Participants in both groups made unprompted comments about the importance of monitoring for changes and new problems after hearing rehabilitation was underway. A participant in Group 2 described the use of smartphone apps and online hearing tests as a way in which people with hearing loss monitor for changes in their hearing thresholds:

> *It's more apps and the way that people are monitoring their hearing. They might go online and do one of those online tests.* (Audiologist employed by a private national chain, 14 years of experience)

However, the majority of the focus group participants described monitoring for changes and new problems as an HLSM activity that people did not undertake. A second Group 2 participant noted that people who wear hearing aids develop problems with their hearing aids that they do not notice:

> *It's actually amazing how long some people have worn hearing aids and that still becomes an issue. Or they don't know why their hearing aid whistles. Right, they've got a hole in the tubing or something like that and they have no concept.* (Audiologist employed in the public sector, 41 years of experience)

Only participants in Group 1 spontaneously mentioned HLSM behaviours related to taking action to address changes and new problems. All discussion on this topic centred on hearing aid use and management. One participant in this group noted that new developments in technology are enabling some clients to seek help with their hearing aids more quickly and efficiently than in the past:

> *Nowadays in teleaudiology, you can use the mobile phone to connect to your hearing aids and they can then connect to the audiologist…. Because then instead of coming for an annual appointment, they can anytime send a message, if they have a problem, we can do a fine-tuning and send it back to them…. But of course*

> *then the client themselves has to – they need to be savvy with technology to do that.* (Audiologist employed in the public sector, 18 years of experience)

However, another participant in Group 1 noted that in his experience, many clients wait until their next scheduled appointment to address problems with their hearing aids:

> *After seeing so many times where somebody's hearing aids have broken down three months ago, and that they waited for their next appointment…. They're miserable. They haven't heard a thing for months and they've withdrawn and, you know, they're really quite – they're very passive.* (Audiologist employed in the public sector, 26 years of experience)

When the facilitator prompted Group 2 to consider taking action to address changes and new problems as a component of HLSM, the participants agreed that this was important. As with Group 1, their comments related exclusively to hearing aid use and management. Their view was that most people do not take action on their own initiative to address problems with their hearing aids:

> *They come back six months later, haven't been wearing [their hearing aids] for three months. Oh, why? They hadn't been working. Why didn't you come in and get them cleaned, and two seconds later, they're back working.* (Audiologist employed by a private national chain, 37 years of experience)

6.3.1.3 HLSM: Psychosocial behaviours

Participants in Group 1 spontaneously raised the issue of managing the effect of hearing loss on emotional wellbeing, but their comments focused exclusively on the audiologist's role in supporting this area of HLSM, rather than behaviours undertaken by the person with the hearing loss. When Group 2 was prompted by the facilitator to consider HLSM in this area, their comments were couched in negative language, with one participant in this group noting that people often adopt maladaptive coping behaviours:

> *When people don't hear properly, if a person was always a little bit socially isolated… that's fine. But if that's simply because when they go out, they get such negative feelings about things that they stop going out, that can't be held as being good. That's a potential problem for mental health issues and depression and lots of other things that we don't know much about.* (Audiologist employed in the public sector, 41 years of experience)

Participants in both focus groups raised the issue of managing the effects of hearing loss on one's social life as an important part of self-managing a hearing loss. A participant in

Group 2 stated that this is something people do when they, or others around them, first notice their hearing difficulties:

> *So what they first do is… recruit their friends, their family to change their behaviour a little bit, to accommodate them in [social] situations and change their own behaviour as well.* (Audiologist employed by a private national chain, 37 years of experience)

However, many participants noted that this was another area of HLSM that they did not believe most people managed effectively. Three participants in Group 2 indicated that avoidance of social situations was a common strategy used by people with hearing loss:

> *Some of them isolate themselves from [social] situations.* (Audiologist employed in the public sector, 41 years of experience)
> *Yeah, withdraw.* (Audiologist employed by a private national chain, 37 years of experience)
> *Just to, I guess, avoid it, so they're not put in those situations.* (Audiologist employed by a private national chain, 40 years of experience)

The audiologists in both focus groups identified a set of HLSM activities that are not explicitly part of the theoretical model of HLSM used in this study: *acknowledge the hearing loss*, *accept the hearing loss*, and *take ownership of the hearing loss*. These activities were classified under the *Psychosocial Behaviours* domain.

Acknowledgement of one's hearing loss was described by a participant in Group 2 as necessary before the person could make decisions about whether or not to pursue hearing rehabilitation:

> *But before you make a decision [about pursuing hearing rehabilitation], you've got to have enough awareness. What actually is going on with you? Because we all know that there are plenty of people who do not know they have a hearing loss. [Audiologists] would be able to say, you must have a hearing loss, you turn the TV up loud. But they wouldn't necessarily… acknowledge that, because first of all, they don't even know they turn the television up louder.* (Audiologist employed in the public sector, 41 years of experience)

A participant in Group 2 stated that after people acknowledge their hearing loss, acceptance of one's hearing difficulties was another necessary step in the progression toward seeking professional hearing help:

> *So then there has to be… an acceptance of what people have said to them [about their hearing loss], all of those steps you have to go through before you do anything and certainly go and see someone about it.* (Audiologist employed in the public sector, 41 years of experience)

A participant in Group 1 also raised the issue of acceptance, suggesting that this can occur long after the person has taken up hearing rehabilitation, with the achievement of successful rehabilitation outcomes positively influencing the feelings of acceptance:

> *But gradually, don't they, by the second set of hearing aids… they're thinking, oh, this actually does make me feel calmer and I can participate more and so on. That's when the acceptance kicks in.* (Audiologist employed in the public sector, 38 years of experience)

Taking ownership of the hearing loss was described by a participant in Group 1 not only as another step toward seeking hearing help, but as a gradually occurring process in and of itself:

> *[Self-managing a hearing loss involves] possibly getting over denial and realising that it's a long process to actually own your problem. And then gradually coming to some conclusion that you're the only one that can do anything about it.* (Audiologist employed by a private independent clinic, 30 years of experience)

The same participant pointed out that the process of acknowledging, accepting, and owning one's hearing loss is not always fully complete at the time professional hearing help is sought, and that this process may extend well beyond the initial provision of hearing rehabilitation:

> *Most clients that I see, it probably takes them, I don't know, their second set of hearing aids, before they're actually even thinking about owning the problem themselves and doing something about it.* (Audiologist employed by a private independent clinic, 30 years of experience)

6.3.2 What do audiologists do to support hearing loss self-management?

Table 6-3 outlines the categories identified for HLSM support, with a representative meaning unit shown for each. Additional meaning units are included in the following sections, in which findings for each category are reported. The *relationship-building* category represents a new concept that emerged from the focus group data.

Table 6-3. Categories of HLSM support, with a representative meaning unit shown for each

Category	Representative meaning unit
Ongoing individualised assessment	"We have to also keep our eye on functional changes within the client. You know, having seen my clients at [suburb] for 21 years and progressed with them as they go into the dementia stage, et cetera, and how they were perfectly capable of doing all these things, and then all of a sudden, no longer."
Collaborative goal-setting	"Well, on one side they'll say, this is the outcome I want, and we can show them the options and tools to get there."
Skill development	"I would take [a hearing aid] instruction booklet and highlight pages that I think are relevant, highlight material and add a comment if I think I need to modify that in some way. So that at least the client sits and I say, there's a lot in this instruction booklet but it may not be relevant to you, so we'll look at the parts that are relevant to you."
Relationship-building	"It's building a relationship, isn't it, with the clients, so that they think that you're interested… that you're involved in their life… that someone else actually knows what they're going through. Because otherwise if you just do a test, fit, follow-up, you don't know them, they don't know you."

Note: The category shown in italics represents a new concept derived from the data that is not part of the theoretical framework for self-management support that guided the study.

6.3.2.1 HLSM support: Ongoing individualised assessment

Participants in both groups highlighted the importance of assessing clients on an ongoing basis to detect functional changes. A participant in Group 1 stated that the identification of new problems often necessitates providing new rehabilitation strategies:

> *But if you're working with older people then their health conditions will change over time. They'll get comorbidities that have to be managed, or you need to adjust their hearing devices or the way they're communicating to take into account these other health factors that are now impinging on their lives in some way.* (Audiologist employed in the public sector, 38 years of experience)

The same participant also noted the importance of continuously assessing the outcomes of these new rehabilitation strategies in order to determine the client's need for additional or different HLSM support:

> *The first intervention is often a device, but then you follow up to see whether that intervention has had the desired effect at managing those expectations. And if it hasn't, which it probably won't 100 per cent of cases, that's when the rehab really needs to kick in at that point, when you say, what other things are we going to do?* (Audiologist employed in the public sector, 38 years of experience)

6.3.2.2 HLSM support: Collaborative goal-setting

HLSM support activities that were categorised as collaborative goal-setting were only mentioned by two participants in Group 2. The first participant linked goal-setting to ongoing individualised assessment, stating that new developments in a client's life often led to the need for new rehabilitation goals:

> *But even by the time you've fitted them or followed them up, there's another group of things that are happening in their life that's changed. Family things could change, their wife could die for example – now they can turn the TV up as loud as they want. There's a million different things that can happen that means their goals change.* (Audiologist employed in the public sector, 41 years of experience)

The second participant described the process of goal-setting as identifying the client's desired outcome, then working backward to determine how best to support the client in achieving that outcome:

> *Well, on one side they'll say, this is the outcome I want, and we can show them the options and tools to get there.* (Audiologist employed by a private independent clinic, 30 years of experience)

6.3.2.3 HLSM support: Skill development

Participants in both groups described engaging in skill development. A participant in Group 1 stated that she focuses on developing clients' skills in challenging listening environments:

> *I try and talk about focus. You know, like if you're in background noise, if all you can hear is the noise, and you're not focusing on what you're actually trying to listen to,*

> *then all you'll do is hear noise, regardless of how good the hearing aid is.* (Audiologist employed by a private independent clinic, 30 years of experience)

A participant in Group 2 described the tailored skill development she provides in the area of hearing aid handling and management:

> *I would take [a hearing aid] instruction booklet and highlight pages that I think are relevant, highlight material and add a comment if I think I need to modify that in some way. So that at least the client sits and I say, there's a lot in this instruction booklet but it may not be relevant to you, so we'll look at the parts that are relevant to you.* (Audiologist employed by a private national chain, 40 years of experience)

A participant in Group 1 reported that she engages in opportunistic skill development outside of scheduled appointments. As a result, she is able to head off problems that have become obstacles to successful HLSM:

> *There's always some aspect [of managing a hearing loss] that they haven't thought of or they hadn't grasped. So, you know, we can just talk about it and, you know, there might be just some little thing that's stopping them from doing whatever…. I don't do anything that's particularly structured. It's just individualised, I guess.* (Audiologist employed by a private independent clinic, 30 years of experience)

6.3.2.4 HLSM support: Relationship-building

Participants in both groups identified a category of HLSM support activities that does not form an explicit part of Lawn and Schoo's (2010) theoretical framework for self-management support. This category was named *relationship-building*. A participant in Group 1 stated that the relationship between the client and clinician was an important partnership underlying the successful provision of HLSM support:

> *It's building a relationship, isn't it, with the clients, so that they think that you're interested… that you're involved in their life… that someone else actually knows what they're going through. Because otherwise if you just do a test, fit, follow-up, you don't know them, they don't know you.* (Audiologist employed by a private independent clinic, 30 years of experience)

Similarly, another Group 1 participant noted that a "connection" to the client was necessary before it was appropriate to raise issues that were not directly related to, but could impinge upon, their ability to self-manage their hearing loss:

> *But you have to have a connection or know what we're going to do if and when [a mental health issue] presents. Now that might be about dementia, or depression… because depression can just stop people from engaging in the whole self-help process.* (Audiologist employed in the public sector, 38 years of experience)

The same participant stated that seeing clients regularly enough to build a relationship enabled them to identify subtle changes in their functioning:

> *I think you need that constant interaction, where you see them regularly and can probably spot when something is a bit different with that person to the last time you saw them. And that relationship-building is key to that.* (Audiologist employed in the public sector, 38 years of experience)

Participants in both groups expressed the belief that case continuity – the client seeing the same audiologist every time – was integral to building a successful client-clinician relationship. A participant in Group 2 noted that lack of case continuity has detrimental effects not only on relationship-building, but also on the clinician's ability to provide appropriate hearing rehabilitation:

> *[The client] gets sick of telling their story after a while, so they either tell the truncated one or don't even bother telling you the key information. Then the tenth audiologist they see doesn't really know what to do with them because they're missing all this info they've only told the first nine.* (Audiologist employed in the public sector, 13 years of experience)

6.3.3 Prioritising areas for improvement

The results of the numerical ranking of the different aspects of HLSM are shown in Figure 6-1. The two areas deemed the highest priority for improvement were:

1. Managing the effect of hearing loss on emotional wellbeing (*Psychosocial Behaviours* domain of HLSM): Participants in the first focus group wanted to gain confidence in initiating a conversation about mental health issues that could affect, or be affected by, hearing loss and to be able to provide appropriate interventions designed to address problems in this area.

2. Taking action to address changes and new problems (*Actions* domain of HLSM): Participants in the second focus group wanted a method for motivating and

empowering clients to take timely action to address new problems, particularly those related to hearing aid function.

Although both focus groups each identified a clear priority for improvement, it is worth noting that all areas of HLSM except understanding hearing loss (Group 1) and adherence to treatment (Group 2) received at least one vote.

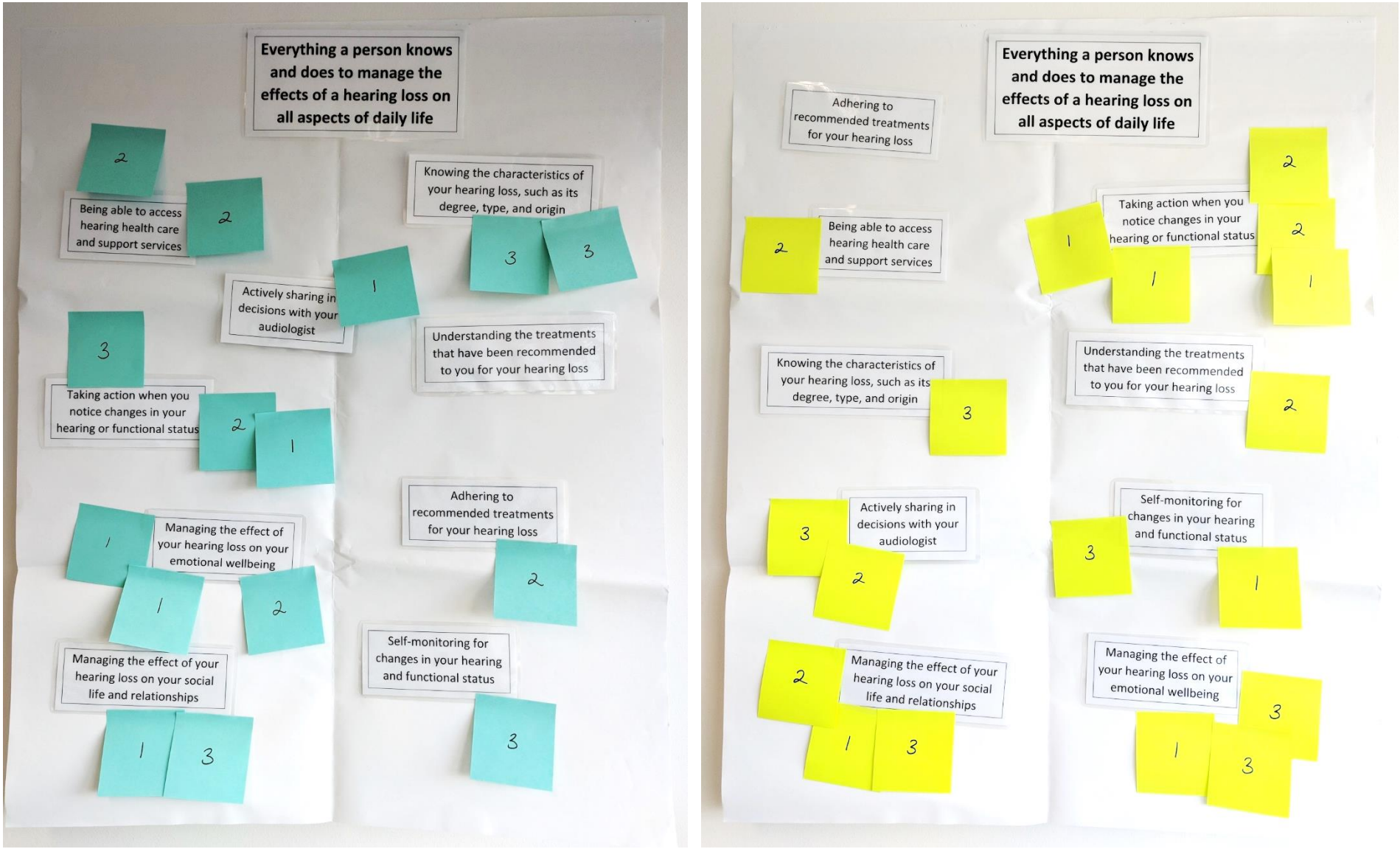

Figure 6-1. The areas of HLSM ranked as priorities to address in future research by Group 1 (L) and Group 2 (R)

6.4 Discussion

The results of this study suggest that audiologists possess a theoretical understanding of HLSM and HLSM support, with focus group participants identifying the majority of behaviours that make up these concepts without prompting. Participants identified several additional dimensions of HLSM and HLSM support that are not explicitly part of the theoretical models of HLSM and HLSM support that guided this study. These include the acknowledgement, acceptance, and ownership of the hearing loss prior to, or as part of, the process of HLSM and relationship-building as a component of HLSM support provision.

The focus group participants conceptualised HLSM and HLSM support in three overarching ways. First, participants frequently referred to the idea that hearing loss affects the whole person, not just the aspects concerned with listening and communication, and that HLSM must therefore be holistic. For example, several participants noted that the onset and progression of hearing loss typically affected people's relationships, emotional state, and social activities, meaning that management strategies need to be in place for all areas of daily life. The idea that hearing loss has multidimensional effects on a person's life is consistent with the World Health Organization's International Classification of Functioning, Disability and Health (ICF), which states that disability not only presents as an impairment of body structures and functions, but also gives rise to activity limitations and participation restrictions (World Health Organization, 2001). Standard definitions of chronic condition self-management also emphasise the necessity of holistic self-management strategies (Barlow et al., 2002; Clark et al., 1991).

Relatedly, the focus group participants expressed the view that audiologists had an important role to play in providing HLSM support aimed at reducing not only listening and communication difficulty, but also the psychosocial effects of hearing loss. At the same time, however, they noted that psychosocial HLSM support was an area of clinical practice in which they felt "out of their depth," citing as barriers a lack of self-efficacy for beginning a conversation about mental health with a client, a lack of training in this area, and a shortage of time for addressing complex psychosocial issues. These attitudes are consistent with the audiology literature, which suggests that the psychosocial consequences of hearing loss are among the least addressed in current clinical practice

(Grenness, Hickson, Laplante-Lévesque, & Meyer, 2014; Meyer, Barr, Khan, & Hickson, 2017) despite being among the most important contributors to the achievement of positive hearing rehabilitation outcomes (Convery, Keidser, et al., in press; Ekberg, Grenness, & Hickson, 2014; Saunders, Frederick, Silverman, Nielsen, & Laplante-Lévesque, 2016).

Second, participants in both focus groups conceptualised both HLSM and HLSM support as stepped, ongoing processes, with several aspects of HLSM described as precursors or prerequisites to the successful enactment of other HLSM behaviours. Participants in both focus groups listed acknowledgement, acceptance, and ownership of the hearing loss as essential first steps before a person could be considered a successful self-manager of his or her hearing loss. However, participants also noted that the process of acquiring and applying HLSM knowledge and skills was not necessarily linear, citing examples of clients for whom full acceptance of the hearing loss came long after hearing rehabilitation was underway. Participants emphasised the need for long-term, ongoing HLSM support strategies that were appropriately tailored to the client's present needs and preferences. Continuous assessment of rehabilitation needs, goals, and outcomes by the audiologist was noted as an essential component of this kind of support.

The characterisation of HLSM and HLSM support as processes is consistent with existing theoretical models of self-management and self-management support. Barlow et al. (2002) define the enactment of self-management behaviours as a "dynamic and continuous process." Similarly, Lawn and Schoo (2010) highlight the importance of assessing a client's self-management on an ongoing basis, not just at the time of diagnosis and the initiation of treatment, since client needs and capabilities can fluctuate over time. However, the focus group participants' conceptualisation of HLSM as a staged process, with particular aspects of HLSM serving as prerequisites to the acquisition and application of later-emerging HLSM behaviours, is not part of existing self-management theory and thus may be considered a novel addition to the concept.

Third, the focus group participants described HLSM and HLSM support as primarily embedded within the context of two interpersonal relationships. The first of these is the relationship between the client and the clinician. The client-clinician partnership is characterised by the CCM as a self-management support component that is fundamental to the achievement of optimal clinical and functional outcomes; the CCM describes this partnership as "productive interactions [between the] informed, activated patient [and the]

prepared, proactive practice team" (Wagner et al., 2001). Focus group participants repeatedly expressed the view that undertaking activities intended to enhance the client-clinician relationship – referred to by many of the participants as "relationship-building" – was a key component of HLSM support. While existing theoretical frameworks for self-management support all hinge on the client-clinician relationship, as described above, none explicitly includes relationship-building as a self-management support activity in and of itself. Lorig and Holman (2003) state that the "formulation of a client-clinician partnership" is a key aspect of self-management, but they describe relationship-building as a self-management task (i.e. undertaken by the client), rather than a self-management *support* task (i.e. undertaken by the clinician). This suggests that the concept of relationship-building in the context of HLSM support represents another novel contribution to self-management support theory.

The other relationship described by the participants is the one between the person with hearing loss and his or her family members. Participants described family members as active participants in all stages of HLSM support: motivating the person to seek hearing help, adopting new behaviours to facilitate communication with the person with hearing loss, providing input to rehabilitation decisions, and assisting with the longer-term management of hearing aids. While the original CCM is patient-centred, Battersby et al. (2010) have expanded the model to include family members, stating that optimal self-management is not just the result of a collaborative partnership between clients and clinicians, but "the product of a partnership between the client, the family, and health care providers." Inclusion of family members in the client-clinician partnership is also consistent with the move in hearing health care (HHC) toward family-centred, rather than patient-centred, models of care (Ekberg, Meyer, Scarinci, Grenness, & Hickson, 2015; Meyer, Scarinci, Ryan, & Hickson, 2015).

6.4.1 Future directions

Based on the group discussions of HLSM and HLSM support, the participants identified a number of areas in which actual clinical practice falls short of theoretical understanding. The areas nominated as the highest priority for future improvement were the assessment and management of issues related to emotional wellbeing and the empowerment of clients to take action to address new problems that may arise during the course of their hearing rehabilitation. These clinician behaviours could potentially be targeted for change with the

COM-B model (Michie et al., 2011) and the Behaviour Change Wheel (Michie et al., 2014). As an example of how this could be carried out, one target behaviour raised in the focus group discussion was screening a client for the presence of depression. Participants noted that depression screening is not routinely performed as part of an audiological assessment, which they attributed in part to a lack of training in how to initiate a conversation with a client about mental health. According to the COM-B, this factor would be classified as *psychological capability*, a component of the model referring to the need for appropriate knowledge and skills in order to successfully perform a particular behaviour (Michie et al., 2011). The Behaviour Change Wheel specifies that the intervention functions that correspond to psychological capability are *education*, *training*, and *enablement* (Michie et al., 2014). If enablement – defined by Michie et al. (2014) as "increasing means and reducing barriers to increase capability or opportunity, beyond education, training, or environmental restructuring" – were chosen as an intervention function, one possible intervention could be a validated clinical tool or questionnaire for guiding a conversation about mental health.

6.4.2 Study limitations

The study results should be considered in the context of several limitations. Eleven participants comprising two focus groups participated in this study. Although many of the same codes and categories were present in the data collected from both groups, in the absence of additional data, we cannot be certain that saturation has been achieved. Even when conducting focus groups with a relatively homogeneous population, Guest, Namey, and McKenna (2017) found that between three and six focus groups are typically required to discover 90% of themes and to ensure saturation has occurred. A larger sample size may have yielded additional insights into audiologists' perceptions of HLSM and HLSM support. Similarly, the participants were drawn from attendees of a single conference, who tended to live in or near the city in which the conference was held and were, on average, older than the average Australian audiologist. More diverse groups of participants may have resulted in different and more varied perspectives.

6.5 Conclusion

Audiologists conceptualise HLSM and HLSM support as stepped, ongoing, evolving processes that encompass the whole client and are embedded in the context of the client's

relationship with others, particularly the audiologist and family members. They also identified new dimensions of both HLSM and HLSM support that do not form part of the theoretical models that guided this study. However, there are a number of gaps between our theoretical understanding of HLSM and HLSM support and enactment of these processes in clinical practice, particularly in the areas of supporting clients' emotional wellbeing and motivating clients to take timely action to address new problems. These findings lay the groundwork for future research in which behaviour change models could be used to identify methods of closing these gaps and bringing about clinician behaviour change.

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Chapter 7. Conclusion

The broad aim of this research was to investigate the applicability of a chronic care framework to hearing health care (HHC) for older adults, with a focus on the complementary roles of self-management and self-management support.

The specific aims were to:

1. Determine whether a pair of existing, validated clinical tools for the assessment of chronic condition self-management could be modified for use with older adults with hearing loss
2. Determine whether the modified tools yielded clinical information that was not currently being gathered with the standard audiological test battery
3. Identify the individual domains of hearing loss self-management (HLSM) and compare them to those that have been identified as applicable to other chronic conditions
4. Identify predictors of HLSM in each of the identified domains
5. Investigate the relationship between HLSM and hearing aid outcomes
6. Explore audiologists' understanding of HLSM and the extent to which it is supported in current clinical practice

7.1 Summary of findings

The aims of this research were addressed through three quantitative studies and one qualitative study; together, the four studies included a total of 102 participants. The five major research findings were:

1. **Validated clinical tools for the assessment of chronic condition self-management can be successfully modified for an audiological context and used to assess HLSM in older adults.** Modified versions of the Partners in Health scale and the Cue and Response interview from the Flinders Chronic Condition Management Program™ (Battersby, Ask, Reece, Markwick, & Collins, 2003) yielded novel clinical information that is not currently being gathered with the standard audiological test battery. The tools enable selective identification of

individual HLSM strengths (e.g. consistent hearing aid use) and weaknesses (e.g. poor emotional coping skills).

2. **HLSM is a multidimensional construct, encompassing not only the knowledge and skills necessary to successfully self-manage a prescribed intervention, but also the knowledge and skills required to self-manage the effects of the hearing loss on all aspects of daily life.** Exploratory factor analysis revealed that HLSM is composed of three domains: (1) *Knowledge* (knowing about hearing loss and one's rehabilitation options); (2) *Actions* (adhering to treatment, participating in shared decision-making, accessing services and resources, attending appointments, and monitoring for and responding to changes in hearing and functional status); and (3) *Psychosocial Behaviours* (managing the effects of hearing loss on one's social life and emotional wellbeing).

3. **Each domain of HLSM is predicted by different personal factors, strengthening the finding that HLSM is a multidimensional construct.** Younger adults and those with experience receiving HHC are more likely to have better HLSM in the *Knowledge* domain; adults who are female, those with experience receiving HHC, and those with higher hearing aid self-efficacy are more likely to have better HLSM in the *Actions* domain; and adults with higher levels of health literacy and those with a more internally oriented health locus of control are more likely to have better HLSM in the *Psychosocial Behaviours* domain.

4. **HLSM is significantly associated with hearing aid outcomes.** Adults who report better HLSM in the *Psychosocial Behaviours* domain are more likely to report less aided listening difficulty in noisy and reverberant environments; adults who report better HLSM in the *Psychosocial Behaviours* domain are more likely to report greater satisfaction with the physical appearance of their hearing aids and their effect on their self-image; and adults who report better HLSM in the *Actions* domain are more likely to report greater satisfaction with the sound quality and performance of their hearing aids.

5. **Clinical audiologists perceive HLSM and HLSM support as ongoing, evolving processes that encompass the whole client and are embedded in the context of the client's relationship with others, including family, the audiologist, and**

other professionals. HLSM was also conceptualised as a staged process, with early self-management strategies serving as precursors or prerequisites to strategies that emerge or are introduced later in the rehabilitation journey.

Together, these studies strengthen the existing body of research suggesting that HHC remains predominantly biomedically focused, device-centred, and clinician-led (Ekberg, Grenness, & Hickson, 2014; Grenness, Hickson, Laplante-Lévesque, Meyer, & Davidson, 2015; Meyer, Barr, Khan, & Hickson, 2017) – all characteristics of acute-focused care – despite formal acknowledgement that permanent hearing loss is a chronic condition (World Health Organization, 2002). The consequences of operating within an acute model of care were articulated by both client and clinician participants in each study; primary among them was the lack of attention given to the assessment and long-term management of the psychosocial effects of hearing loss. The need to improve clinical practice in this area becomes all the more pressing in light of the finding that successful self-management of the effects of hearing loss on one's social life and emotional wellbeing are significantly linked to hearing aid outcomes. Clinical practice patterns are unlikely to change, however, simply as a result of clinician education (Boisvert et al., 2017). The audiologist participants in this research demonstrated a sophisticated theoretical understanding of HLSM that fit well with the Chronic Care Model (CCM; Wagner et al., 2001), suggesting that their level of knowledge in this area is already high. A profession-wide move toward holistic HHC is more likely to occur if audiologists are empowered to align their clinical practice with best-practice chronic care models such as the CCM and effect change at the system level.

7.2 Research limitations

The older adults who took part in the three quantitative studies (Chapters 3-5) had all volunteered to participate in research and were likely to be more highly motivated than the average member of the wider hearing-impaired community. All participants were drawn from a geographic area of high socioeconomic status and were relatively uniform in terms of race and ethnicity, which limits the generalisability of the results. Similarly, the audiologists who participated in the focus groups (Chapter 6) are not necessarily representative of all audiologists in Australia. The focus group participants were drawn from attendees of a single conference and most lived in or near the city in which the conference was held. Additionally, the focus group participants tended to be, on average,

older than the average Australian audiologist. Larger or more diverse groups of participants may have yielded different insights into audiologist perceptions of HLSM.

HLSM was assessed in this study with the Partners in Health scale and the Cue and Response interview, both of which could be classified as self-report measures. Self-report measures of HLSM reflect the respondents' subjective assessment of how well they believe they self-manage, rather than capture the actual means by which the respondents self-manage day-to-day or how successful they are at doing so. Relatedly, each of the 91 Cue and Response interviews was conducted by a single clinician with over 15 years of experience as an audiologist. It is possible that the results were influenced by the clinician's skill set and experience level, and that a clinician with a different background may have obtained different responses to the interview questions.

Of the three HLSM domains identified in the exploratory factor analysis, two domains – *Knowledge* and *Psychosocial Behaviours* – consisted of only two items from the Partners in Health scale/Cue and Response interview. Standard practice in exploratory factor analysis dictates that at least three items should load on each extracted factor to ensure the solution is statistically robust (Costello & Osborne, 2005). However, in the factor analysis conducted on the original Partners in Health scale, two of the identified domains of self-management also consisted of only two items (Smith, Harvey, Lawn, Harris, & Battersby, 2017). This may reflect a weakness of the original self-management assessment itself and suggests that there is scope for its further refinement.

7.3 Clinical implementation and future directions

This research has identified HLSM as a potentially important factor to consider in the hearing rehabilitation process. The findings described in this thesis suggest several possible avenues for future HLSM work.

First, further development of the HLSM assessment should have as its ultimate goal implementation of the tool into clinical practice. In order to achieve this, future work could draw on behaviour change methodology using the Behaviour Change Wheel (Michie, van Stralen, & West, 2011). In the context of incorporating HLSM support into clinical practice, the Behaviour Change Wheel could provide a theoretical framework for defining the specific behaviours that that could lead to improved HLSM support, selecting the

behaviour(s) that are likely to be amenable to intervention, and identifying appropriate intervention functions that could be used to bring about the desired behaviour(s). As described in Chapter 6, the audiologists who participated in focus groups aimed at exploring their perceptions of HLSM and HLSM support identified management of a client's emotional wellbeing as one of the priority areas to address in future work. A potential target behaviour could therefore be assessing a client for the presence of depression. One of the factors identified by the focus group participants as influencing this behaviour was their uncertainty about how to initiate a conversation with a client on this topic. This factor would be classified as part of the *reflective motivation* component of the COM-B and the *beliefs about capabilities* domain of the TDF. The COM-B model specifies that the intervention functions that correspond to reflective motivation are education, persuasion, incentivisation, coercion, and enablement. If enablement – defined by Michie, Atkins, and West (2014) as "increasing means and reducing barriers to increase capability or opportunity, beyond education, training, or environmental restructuring" – were chosen as an intervention function, one possible intervention could be a validated clinical tool or questionnaire for guiding a conversation about mental health.

Practical aspects of the HLSM assessment tool must also be addressed as part of the development and implementation process. For example, in their current form, the Partners in Health scale and the Cue and Response interview can take up to 45 minutes to complete, which would place an undue burden on the limited time clinical audiologists have available for client care. Similarly, the Partners in Health scale and the Cue and Response interview are both paper-based, a format that is incompatible with the growing shift toward paperless audiology clinics and cloud-based data storage. Streamlining and digitising the tools such that they are quicker and more efficient to use and better integrated into existing clinical systems will increase the likelihood that they will be successfully implemented in clinical practice.

Second, the research described in this thesis identified a significant association between specific domains of HLSM and aspects of hearing aid benefit and satisfaction. However, the findings did not definitively establish the direction of that relationship – whether better HLSM leads to better hearing aid outcomes or whether achieving better hearing aid outcomes leads individuals to perceive that they have better HLSM – nor did they demonstrate that improving an individual's HLSM can improve their hearing aid outcomes. Future research should include prospective studies of the relationship between HLSM and

hearing rehabilitation outcomes in order to determine whether HLSM is a worthy target for clinical intervention.

Third, if a significant causative relationship between HLSM and hearing rehabilitation outcomes is found, behaviour change methodology could be applied as described above, but with a focus on changing client HLSM behaviours. Future work in this area would thus necessitate the development and evaluation of HLSM interventions to match the strengths and weaknesses identified by the HLSM assessment. Given the identified relationship between the *Psychosocial Behaviours* HLSM domain and multiple aspects of hearing aid benefit and satisfaction, in addition to previous studies suggesting that the psychosocial aspects of living with a hearing loss are among the least addressed in hearing rehabilitation (Ekberg et al., 2014; Grenness et al., 2015; Meyer et al., 2017), HLSM interventions should ideally prioritise this HLSM domain. Such interventions could take the form of existing programs that focus on communicative and psychosocial functioning, such as the Active Communication Education (ACE) program (Hickson, Worrall, & Scarinci, 2007) or C2Hear (Ferguson, Brandreth, Brassington, Leighton, & Wharrad, 2016). Alternatively, the development of new interventions based on the Flinders Chronic Condition Management Program™'s low-intensity cognitive-behavioural therapy workbooks (Venning, Redpath, & Orlowski, 2017) could be a feasible strategy for bringing more evidence-based psychological interventions into clinical practice in audiology.

7.4 Conclusion

The series of studies described in this thesis set out to determine whether the complementary concepts of chronic condition self-management and self-management support were conceptually applicable to older adults with hearing loss. Taken as a whole, the findings suggest that HLSM is both a viable and important factor to assess as part of the hearing rehabilitation process and that there are a number of gaps in current HLSM support provision that could be targets for improvement in future research and clinical practice.

7.5 References

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Appendix A. Permission to modify the Partners in Health scale and Cue and Response interview from the Flinders Human Behaviour and Health Research Unit of Flinders University

25 June 2015

Flinders University
Office

Flinders Human Behaviour &
Health Research Unit (FHBHRU)
Margaret Tobin Centre
Flinders University
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Adelaide SA 5001
Telephone +61 8 8204 4463
Facsimile +61 8 8404 2101
www.flinders.edu.au/fhbhru

Elizabeth Convery
Senior Research Audiologist
National Acoustic Laboratories
Australian Hearing Hub
16 University Avenue
Macquarie University NSW 2109

Dear Elizabeth,

RE: Permission to use the Flinders Program tools in a research context

This letter provides approval to proceed with the proposed modification of the Partners in Health (PIH) scale for the research covered under your license which was emailed to the National Acoustic Laboratories early in May 2015 and gives approval to use the resulting tool as a PIH modification.

Flinders Human Behaviour and Health Research Unit have assessed current wording of the proposed audiology-specific tools to be used for research to be conducted jointly by the National Acoustic Laboratories, the HEARing Cooperative Research Centre, and the University of Queensland. We have reviewed the proposed changes to wording of some items within the PIH (as per below table) and confirm that wording is consistent with the PIH and underlying theory and research.

In addition to acknowledgements and conditions required in the license, reports of work based on the modified tool must state that the tool was modified from the PIH with permission of the Flinders Human Behaviour and Health Research Unit.

We look forward to hearing about the progress and outcomes of your project.

Yours sincerely,

A/Professor Sharon Lawn
Director
Flinders Human Be4haviour I Health Research Unit

cc: Ms Melanie Harris

CRICOS No. 00114A

inspiring

Appendix B. Modified Partners in Health scale and Cue and Response interview worksheets

Participant _____

Date _____

Flinders Program™ Partners in Health scale

Please select the appropriate number ranging from 0 to 8 for the following questions. Circle only one number for each question.

1. Overall, what I know about my hearing loss is:

0	1	2	3	4	5	6	7	8
Very little				**Something**				**A lot**

2. Overall, what I know about the management of my hearing loss is:

0	1	2	3	4	5	6	7	8
Very little				**Something**				**A lot**

3. I manage my hearing loss as asked by my hearing health professional:

0	1	2	3	4	5	6	7	8
Never				**Sometimes**				**Always**

4. I share in decisions made about my hearing loss with my hearing health professional:

0	1	2	3	4	5	6	7	8
Never				**Sometimes**				**Always**

5. I am able to deal with hearing health professionals to get the services I need that fit with my culture, values, and beliefs:

0	1	2	3	4	5	6	7	8
Never				**Sometimes**				**Always**

6. I attend appointments as asked by my hearing health professional:

0	1	2	3	4	5	6	7	8
Never				**Sometimes**				**Always**

7. I keep track of any changes in my hearing status (e.g. sudden or gradual drop in hearing, pain or infection in my ears, hearing aids stopped working, problems handling or inserting my hearing aids):

0	1	2	3	4	5	6	7	8
Never				**Sometimes**				**Always**

8. I take action when I notice these changes:

0	1	2	3	4	5	6	7	8
Never				**Sometimes**				**Always**

9. I manage the effect of my hearing loss on how I feel (e.g. my emotions and my spiritual wellbeing):

0	1	2	3	4	5	6	7	8
Not very well				**Fairly well**				**Very well**

10. I manage the effect of my hearing loss on my social life (e.g. my ability to participate, how I mix with other people, and my personal relationships):

0	1	2	3	4	5	6	7	8
Not very well				**Fairly well**				**Very well**

11. Overall, I manage to live a healthy lifestyle (e.g. no smoking, healthy food, moderate alcohol, regular physical activity, sleep well, manage stress and worry):

0	1	2	3	4	5	6	7	8
Not very well				**Fairly well**				**Very well**

Participant _____

Date _____

Flinders Program™ Cue & Response interview

CUE QUESTIONS	NOTES	PIH SCORE	AUD SCORE	AGREED SCORE
1. Knowledge of condition • What do you know about your hearing loss? (cause, effects) • What do your family and friends understand about your hearing loss?				
2. Knowledge of treatment • What can you tell me about your treatment? • What could happen if you discontinued your treatment? • What other options for treating your hearing loss do you know about? • What do your family and friends understand about your treatment?				
3. Treatment management • What stops you from adhering to the treatment recommended by your hearing health professional? (lack of understanding, knowing what to do/why, time, physical barriers)				
4. Sharing in decisions • How involved do you feel in making decisions about your hearing with your audiologist? • Does your audiologist listen to you? • Is there anyone who makes your hearing health decisions for you?				
5. Accessing services • How do you get the services you need to manage your hearing loss? • How do these services fit in with your culture, beliefs, and values? • How confident do you feel dealing with audiologists in order to get these services? • Is there anything that stops you from using these services?				
6. Attending appointments • Is there anything that prevents you from attending appointments with your audiologist? (cost, transport, physical health)				

0 1 2 3 4 5 6 7 8

Very little/Never/Not very well — Something/Sometimes/Fairly Well — A lot/Always/Very well

CUE QUESTIONS	NOTES	PIH SCORE	AUD SCORE	AGREED SCORE
7. Monitoring • What are some of the changes in your hearing status that you need to keep an eye out for? (drop in hearing, new problems managing hearing aids)				
8. Response management • What would you do if you noticed some of these changes? • Would anything stop you from taking the recommended action?				
9. Impact on emotional wellbeing • Do you ever feel as though the effort of daily activities is too much for you because of your hearing loss? (feeling tired, can't be bothered) • Does your hearing loss ever get you down? • How do you feel about your life at the moment?				
10. Impact on social life • Tell me about the people who support you. • How does your hearing loss affect the way you socialise with other people? • What aspects of your social life would you like to change? • How does your hearing loss affect your ability to undertake work and hobbies?				
11. Healthy lifestyle • What do you do to stay as healthy as possible? • What do you do that makes your health worse? • What aspects of your lifestyle would you like to change? • We've talked about many things – is there anything else you would like to add?				

0 1 2 3 4 5 6 7 8

Very little/Never/Not very well — Something/Sometimes/Fairly Well — A lot/Always/Very well

Appendix C. Ethics approval letters from the Australian Hearing Human Research Ethics Committee

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National Acoustic Laboratories

Australian Hearing Human Research Ethics Committee *APPROVAL FOR RESEARCH INVOLVING HUMAN SUBJECTS*	
APPROVAL NUMBER: AHHREC2016-4	
Project Number	XR4.2.1A
Project Title	Self-fitting hearing aids: predictors of success with initial setup and ongoing use, fitting outcomes, and the role of clinical support
Classification	*Class 2: Project with low risk*
Principal Investigators authorized to conduct research	Elizabeth Convery, Gitte Keidser, Louise Hickson, Carly Meyer
Date Approved	12/1/2016
Approval Method	Approved by the Chairman as a Class 2, low risk project, to be ratified by the Ethics Committee at their next meeting.

This approval is based on the information contained in the ethics application that was presented to the Research Director and Chairman on 11/12/2015 and is conditional upon your continuing compliance with the National Statement on Ethical Conduct in Human Research (2007) available at:

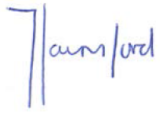
https://www.nhmrc.gov.au/book/national-statement-ethical-conduct-human-research .

A duplicate set of the documents is enclosed for your records.

Annual reporting to the Committee on progress of the project is required including a final report when the work is completed or discontinued for any reason. Reminders will be sent when progress reports are due.

The Committee expects to be notified of any changes to the approved protocol or other issues that may have an impact on the ethics of the project either by means of the annual progress reports (checklists) or as an application for variation. Adverse or unforeseen events that affect the continued ethical acceptability of the project should be reported to the Chairman immediately.

All future correspondence relating to the ethical aspects of this project must quote the above Approval Number.



Dr Tim Gainsford
Operations & Finance Manager, NAL
and AHHREC Secretary

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Australian Hearing Human Research Ethics Committee *APPROVAL FOR RESEARCH INVOLVING HUMAN SUBJECTS*	
APPROVAL NUMBER: AHHREC2016-10	
Project Number	CR4.2.1A-variation
Project Title	Self-fitting hearing aids: predictors of success with initial setup and ongoing use, fitting outcomes, and the role of clinical support
Classification	Class 2
Principal Investigators authorized to conduct research	E. Convery, G. Keidser, L. Hickson and C. Meyer
Date Approved	23rd March 2016
Approval Method	Approved by the Chairman as a Class 2, low risk project, to be ratified by the Ethics Committee at their next meeting.

This approval is based on the information contained in the ethics application that was presented to the Chairman on the 16th of March 2016 and is conditional upon your continuing compliance with the National Statement on Ethical Conduct in Human Research (2007) available at:

https://www.nhmrc.gov.au/book/national-statement-ethical-conduct-human-research .

A duplicate set of the documents is enclosed for your records.

Annual reporting to the Committee on progress of the project is required including a final report when the work is completed or discontinued for any reason. Reminders will be sent when progress reports are due.

The Committee expects to be notified of any changes to the approved protocol or other issues that may have an impact on the ethics of the project either by means of the annual progress reports (checklists) or as an application for variation. Adverse or unforeseen events that affect the continued ethical acceptability of the project should be reported to the Chairman immediately.

All future correspondence relating to the ethical aspects of this project must quote the above Approval Number.

Dr Tim Gainsford
Operations & Finance Manager, NAL
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National Acoustic Laboratories

Australian Hearing Human Research Ethics Committee [EC00109]

APPROVAL FOR RESEARCH INVOLVING HUMAN SUBJECTS **APPROVAL NUMBER: AHHREC2018-1**	
Project Number	XR4.2.1d
Project Title	The relationship between hearing loss self-management and hearing aid outcomes.
Classification	*Class 1: Project involving negligible risk.*
Principal Investigators authorized to conduct research	Elizabeth Convery, Gitte Keidser, Louise Hickson[1], Carly Meyer[1] [1] HEARing CRC and University of Queensland
Date Approved	11/01/2018
Approval Method	Approved by two uninvolved senior NAL researchers as a Class 1 project with negligible risk.

This approval is based on the information contained in the ethics application that was presented to Senior NAL researchers on 19/12/2017 and is conditional upon your continuing compliance with the National Statement on Ethical Conduct in Human Research (2007) available at:

https://www.nhmrc.gov.au/book/national-statement-ethical-conduct-human-research .

A duplicate set of the documents is enclosed for your records.

Annual reporting to the Committee on progress of the project is required including a final report when the work is completed or discontinued for any reason. Reminders will be sent when progress reports are due.

The Committee expects to be notified of any changes to the approved protocol or other issues that may have an impact on the ethics of the project either by means of the annual progress reports (checklists) or as an application for variation. Adverse or unforeseen events that affect the continued ethical acceptability of the project should be reported to the Chairman immediately.

All future correspondence relating to the ethical aspects of this project must quote the above Approval Number.

Dr Tim Gainsford
Operations & Finance Manager, NAL
and AHHREC Secretary

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National Acoustic Laboratories

Australian Hearing Human Research Ethics Committee [EC00109]

APPROVAL FOR RESEARCH INVOLVING HUMAN SUBJECTS **APPROVAL NUMBER: AHHREC2018-11**	
Project Number	XR4.2.1e
Project Title	Audiologist perceptions of hearing loss self-management promotion and support with adult clients.
Classification	*Class 1: Project involving negligible risk.*
Principal Investigators authorized to conduct research	Elizabeth Convery[1], Gitte Keidser[1], Louise Hickson[2], Carly Meyer[2] *1 – NAL* *2 – HEARing CRC and University of Queensland*
Date Approved	11/04/2018
Approval Method	Approved by two uninvolved senior NAL scientists as a Class 1 project with negligible risk.

This approval is based on the information contained in the ethics application that was presented to senior NAL scientists on 04/04/2018 and is conditional upon your continuing compliance with the National Statement on Ethical Conduct in Human Research (2007) available at:

https://www.nhmrc.gov.au/book/national-statement-ethical-conduct-human-research .

A duplicate set of the documents is enclosed for your records.

Annual reporting to the Committee on progress of the project is required including a final report when the work is completed or discontinued for any reason. Reminders will be sent when progress reports are due.

The Committee expects to be notified of any changes to the approved protocol or other issues that may have an impact on the ethics of the project either by means of the annual progress reports (checklists) or as an application for variation. Adverse or unforeseen events that affect the continued ethical acceptability of the project should be reported to the Chairman immediately.

All future correspondence relating to the ethical aspects of this project must quote the above Approval Number.

Dr Tim Gainsford
Operations & Finance Manager, NAL
and AHHREC Secretary

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ABN 80 308 797 003

Appendix D. Ethics approval letters from the University of Queensland Medical Research Ethics Committee

THE UNIVERSITY OF QUEENSLAND

Institutional Human Research Ethics Approval

Project Title:	Self-fitting Hearing Aids: Predictors of Success with Initial Setup and Ongoing Use, Fitting Outcomes, and the Role of Clinical Support
Chief Investigator:	Ms Elizabeth Convery
Supervisor:	Prof Louise Hickson, Dr Carly Meyer
Co-Investigator(s):	Gitte Keidser
School(s):	School of Health and Rehabilitation Sciences
Approval Number:	2016000447
Granting Agency/Degree:	PhD
Duration:	31st December 2016

Comments/Conditions:

Expedited review on the basis of approval from the Australian Hearing HREC dated 12/01/2016 (AHHREC2016-4) and Variation approved 23/03/2016 (AHHREC2016-10)

Note: if this approval is for amendments to an already approved protocol for which a UQ Clinical Trials Protection/Insurance Form was originally submitted, then the researchers must directly notify the UQ Insurance Office of any changes to that Form and Participant Information Sheets & Consent Forms as a result of the amendments, before action.

Name of responsible Committee:
Medical Research Ethics Committee
This project complies with the provisions contained in the *National Statement on Ethical Conduct in Human Research* and complies with the regulations governing experimentation on humans.

Name of Ethics Committee representative:
Dr Jennifer Paratz
Acting Chairperson
Medical Research Ethics Committee

Signature _____ Date 7/4/16.

THE UNIVERSITY OF QUEENSLAND
AUSTRALIA

Human Ethics Research Office

Cumbrae-Stewart Building #72
The University of Queensland
St Lucia, QLD 4072

CRICOS PROVIDER NUMBER 00025B

12/01/2018

Ms Elizabeth Convery, Dr Gitte Keidser, Prof Louise Hickson, Dr Carly Meyer
School of Health and Rehabilitation Sciences

Dear Ms Convery,

Clearance Number: 2018000031
Project Title: "(XR4.2.1d) The relationship between hearing loss self-management and hearing aid outcomes"

Following administrative review of the human research ethics approval from NAL Australian Hearing Human Research Ethics Committee, I am pleased to advise that, as the University of Queensland's authorised delegate for the University of Queensland's Human Research Ethics Committees A & B, approval is granted for this project.

Approval has been based on the already approved documents in NAL Australian Hearing HREC Approval Letter dated 11/01/2018.

Additionally the following documents are noted and/or approved:

Document	Version	Date
Application Form		19/12/2017
Recruitment Letter		
Information and Consent Form		Jan 2018
Abbreviated Profile of Hearing Aid Benefit		1994
Satisfaction with Amplification in Daily Life		
Flinders Program Cue and Response Interview		
Flinders Program Partners in Health Scale		

This project has been approved to 11th January 2019.

We would like to take this opportunity to remind you that, should any modifications be made to this project, they will need to be approved by the lead human research ethics committee prior to being forwarded to the University of Queensland's Human Research Ethics Office for administrative review and approval.

THE UNIVERSITY OF QUEENSLAND
AUSTRALIA

Human Ethics Research Office

Cumbrae-Stewart Building #72
The University of Queensland
St Lucia, QLD 4072

CRICOS PROVIDER NUMBER 00025B

Furthermore, conditions of the University of Queensland HREC Approval, require the researcher to provide an annual report and a final report on completion of the study (copy of lead HREC report will suffice). On commencement of this research, the researcher provides an undertaking to notify the University of Queensland's Human Research Ethics Office of all complaints or adverse events that may arise from this research.

Please keep a copy of this document for your records.

Kind regards,

Chris Rose'Meyer
Governance Officer
Office of Research Ethics
The University of Queensland

THE UNIVERSITY OF QUEENSLAND
AUSTRALIA

Human Ethics Research Office

Cumbrae-Stewart Building #72
The University of Queensland
St Lucia, QLD 4072

CRICOS PROVIDER NUMBER 00025B

18 April 2018

Elizabeth Convery
School of Health and Rehabilitation Sciences

Dear Ms Convery,

Clearance Number: 2018000789 / XR4.2.1e
Project Title: "Audiologist perceptions of hearing loss self-management promotion and support with adult clients"

Following administrative review of the human research ethics approval from the Australian Hearing Human Research Ethics Committee, I am pleased to advise that, as the University of Queensland's authorised delegate for the University of Queensland's Human Research Ethics Committees A & B, approval is granted for this project.

Approval has been based on the already approved documents listed in the reviewed application as approved by the Australian Hearing Human Research Ethics Committee in Letter dated 11/04/2018.

This project has been approved to 30 June 2018.

We would like to take this opportunity to remind you that, should any modifications be made to this project, they will need to be approved by the lead human research ethics committee prior to being forwarded to the University of Queensland's Human Research Ethics Office for administrative review and approval.

Furthermore, conditions of the University of Queensland HREC Approval, require the researcher to provide an annual report and a final report on completion of the study (copy of lead HREC report will suffice). On commencement of this research, the researcher provides an undertaking to notify the University of Queensland's Human Research Ethics Office of all complaints or adverse events that may arise from this research.

Please keep a copy of this document for your records.

Kind regards,

Chris Rose'Meyer
Governance Officer
Office of Research Ethics
The University of Queensland

List of approved investigators

Dr Gitte Keider
Prof Louise Hickson
Dr Carly Meyer